U.S. ARMY CORPS OF ENGINEERS U.S. GOVERNMENT MOORINGS FACILITY
CSM Site Summary

U.S. MOORINGS

Oregon DEQ ECSI #: 1641

8010 NW St. Helens Rd.
DEQ Site Mgr: Tom Roick
Latitude: 45.5808°
Longitude: -122:7632°
Township/Range/Section: 1N/1W/12

River Mile: 6.2 West bank

LWG Member ☐ Yes ☒ No

Upland Analytical Data Status: ☐ Electronic Data Available ☒ Hardcopies only

1. SUMMARY OF POTENTIAL CONTAMINANT TRANSPORT PATHWAYS TO THE RIVER

The current understanding of the transport mechanism of contaminants from the uplands portions of the USACE – Portland Moorings (U.S. Moorings) site to the river is summarized in this section and Table 1, and supported in the following sections.

1.1. Overland Transport

According to USACE (1994a), the usable land surface at U.S. Moorings is flat with only a few feet change in elevation. Approximately half of the site is unpaved. Overland transport of sheet runoff from the eastern half of the upland site to the river is minimal because water is generally transported through a stormwater collection system. Surficial soils in the western half of the site have some detected metals. Stormwater sheet runoff in this area is a potential but unknown transport pathway for metals to reach the river.

1.2. Riverbank Erosion

The sloping shoreline is armored with riprap to minimize bank erosion. Soil erosion and deposition at the site is believed to be low (USACE 1994a).

1.3. Groundwater

Groundwater samples have not been collected to assess water quality at the site (USACE 1994a). Therefore, insufficient data are available to evaluate this potential contaminant transport pathway. In addition, no information was available in the DEQ files suggesting that groundwater-related preferential transport pathways have been evaluated at the site.

1.4 Direct Discharge (Overwater Activities and Stormwater/Wastewater Systems)

Current operations at U.S. Moorings facility include providing docking facilities, maintenance, and overhaul to support the dredge fleet and the hydrographic survey vessels. Operations that are no longer carried out include fueling of the dredges, sandblasting, and vehicle maintenance (USACE 1994a). Occasional minor oil spills from overwater activities have been recorded as recent as 2000 (see Section 8.3). Rainwater from five separate drainage areas at the site is funneled into 500-gallon oil/water separators and then through collection culverts that discharge to the Willamette River (see Section 10.3.2).

1.5. Relationship of Upland Sources to River Sediments

See Final CSM Update.

1.6. Sediment Transport

The U.S. Moorings facility is located on the west side of the river at RM 6.2 in the center of a narrow river reach (RM 5-7) that is characterized as a transport/non-depositional zone based on the site physical information compiled in the Programmatic Work Plan (Integral et al. 2004). The Sediment Trend Analysis® results indicate that sediment movement along this side of the river alternates between net accretion and net deposition and is in dynamic equilibrium along the far side of the river. The measured bathymetric changes over the 25-month period from January 2002 through February 2004 (Integral and DEA 2004) reveal a relatively contiguous area of net sediment erosion (up to 2 ft in extent) along channel slope in front of the property between the –10 and –30 ft NAVD88 contours. Shoreward of the –10 ft contour, the area predominately shows no riverbed elevation change, although net sediment accretion (up to 1 ft in extent) is evident in the downstream lee of the dock structure located at the upstream end of the property. A few other small patches of sediment accretion are scattered throughout this protected inshore area. No-change area is for the inner portion of the Portland Moorings cove that is above the 0 ft NAVD88 contour and could not be accessed by the hydro-survey vessel. The main channel offshore of the Portland Moorings facility is dominated by areas of relatively small-scale (< 1 ft in extent) sediment scour interspersed with areas of no change. An exception to this is sediment accretion evident in a deep mid-channel hole (-60 ft NAVD88) situated offshore of the upstream edge of the property.

2. CSM SITE SUMMARY REVISIONS

Date of Last Revision: March 4, 2005

3. PROJECT STATUS

Source: DEQ 2004a, Gross 2004, pers. comm.

Activity		**Date(s)/Comments**
PA/XPA	☒	June 20 1990 (GRI 1990), April 1994 (USACE 1994a)
RI	☐	RI Work Plan in progress - sent to EPA for review mid-2004 (Gross 2004, pers. comm.).
FS	☐	
Interim Action/Source Control	☐	
ROD	☐	
RD/RA	☐	
NFA	☐	

Site sediment investigations were performed at the following times: October 12, 1989 (USACE 1990), June 14, 1994 (USACE 1994b), December 20, 1994 (USACE 1994c), and May 1995 (USACE 1996). Soil samples were also collected at the site in December 1994.

DEQ Portland Harbor Site Ranking (Tier 1, 2, or 3): Tier 1

4. SITE OWNER HISTORY

Sources: Multnomah County Taxation records, Polk City of Portland directories, Sanborn fire insurance maps, USACE Port Series reports, USACE 1994a.

Owner/Occupant	Type of Operation	Years
U.S. Army Corps of Engineers-Portland Moorings (a.k.a. COE Civil Portland Moorings, U.S. Government Moorings, U.S. Moorings)	Government port, supply, repair facilities for dredge and other support vessels, warehousing facilities, fuel storage, motor pool garage and parking.	1904 - present
Misc. private owners	Unknown, possibly undeveloped	1850 - 1904

5. PROPERTY DESCRIPTION

The U.S. Moorings facility is located at 8010 NW St. Helens Road on the Willamette River at approximately RM 6.2 and 0.25 mile south of the St. John's Bridge (USACE 1994a). The region around the site is characterized by heavy industry along the river and a mix of residential, commercial, industrial, and recreational properties west of St. Helens Road. Figure 1 shows the U.S. Moorings property flanked on the east side by the Willamette River and on the west side by the railroad and St. Helens Road. Downstream from the site, on the northwest side of the parcel line is the Hendren Tow Boats property. Upstream from the site, on the southeast side of the parcel line is the Northwest Natural Gas Company property. The breakdown of the site area usage includes a large water parcel as described in the table below.

Feature	Area (square feet)	Area (acre)
Building Footprint	43,008	0.99
Dock Area	26,700	0.61
Paved/Rock Area	240,929	5.53
Landscape Area	61,400	1.41
Water	336,287	7.72

The usable land surface is flat with only a few feet change in elevation. Approximately one-half of the site's 13.14-acre area is covered by asphalt pavement. A storm drain system funnels rainwater into an oil/water separator and through collection culverts that drain into the Willamette River. Figure 1 shows 12 private outfalls along the eastern side of the property. A brief history of the site's drainage system is given in Section 10.3.2. The sloping shoreline is armored with riprap protection to mitigate bank erosion of the nearshore soils.

The site contains 13 buildings, three trailers, and several storage sheds, as shown in Supplemental Figure 2 from USACE (1994a). The dock area is split into Dock "A" and Dock "B." Dock "A" contains the crane and crane house. A small boat floating dock is connected to the land by a ramp near the north corner of the carpentry and electrical shop (building #3). A June 11, 1991, aerial photograph [see Supplemental Figure 1 from USACE (1994a)] shows that the floating dock used to be farther into the cove and connected to the land by a ramp situated between building #3 and building #17. A large open unpaved storage area for oversized and heavy materials and supplies is situated on the northeast part of the property where sand blasting used to be done. Most of the automobile parking areas are located on the south end of the site. Security at the site includes one perimeter fence surrounding the entire land area. For the western area [Logistics Management Office (LMO) warehouse] there is a gated perimeter fence around the storage and warehouse area, which faces the Willamette River side. There are no drinking water wells at the site.

Information regarding the lease of submerged lands and/or overwater structures was not found in Oregon Department of State Lands files. River channel lands in and around Dock A are not owned by the Corps, but are being used by the Corps under the Federal Navigation Servitude Law (USACE 1994a).

6. CURRENT SITE USE

According to MacKenzie/Saito & Associates (MSA 1990), the Operations Division Navigation Branch, which controls the entire U.S. Moorings site, is divided into three distinct organizations that operate at the site.

1. The Plant Section is responsible for the buildings and grounds, in addition to the engineering and repair of all floating stock operated by the other two sections.
2. The Dredge Operations Section is responsible for planning, supporting, and operating the floating stock of dredging vessels.
3. The Hydrographic Surveys Sub-Section is responsible for planning, supporting, and operating the floating stock of survey vessels.

Current operations at U.S. Moorings include vessel moorage at docking facilities, vessel maintenance, and vessel overhaul in support of the dredge fleet and hydrographic survey vessels. Operations that are no longer carried out include fueling of the dredges, sandblasting, and vehicle maintenance. The U.S. government is a small-quantity hazardous waste generator at this site. The use of hazardous materials on vessels is minimized, and all waste disposal is handled appropriately (USACE 1994a).

7. SITE USE HISTORY

The first inhabitants to use the site were members of the Chinook tribe (MSA 1990). Chief Cazeno or Cassino sold the site, which was then part of a larger parcel, to (b) (6) [redacted] in 1850. Property ownership was transferred four times before the U.S. Army Corps of Engineers acquired it in 1903 (see Section 4). The site remained undeveloped until 1904 when construction began on the southern bulkhead, quarters for an overseer, a large storehouse, and an 8,000-gallon water tank. In February 1904, the District's "fleet" was transferred to the site.

An additional tract of land was purchased in 1905. The bulkhead was completed in 1914, and dredged material from the Willamette was used for fill, which provided an additional 4.6 acres of ground space. Significant expansion of repair facilities occurred with the construction of the lumber and steel storage warehouse in 1917, and the relocation and expansion of the sales store building and the garage in 1937. In 1938 and 1939, a new office, locker, soils laboratory and pattern storage buildings were built. In 1940, a 5.8-acre tract was acquired, and in 1945 partial filling of the new parcel with dredged material added an additional 1.7 acres of usable land. Three warehouses and a machine shop were added to the new land between 1940 and 1945. Between 1961 and 1967, the following buildings were removed: the lumber and sheet warehouse, the overseer's quarters, the carpenter shop, and the sales store building. Based on a comparison of aerial photos, the site has remained unchanged since 1967. The Supplemental Site Map from MSA (1990) shows the buildings locations and their numbers, which are referenced in the table below.

Building Number	Building Name	Building Date	Activities
1	Plant section office	1938	
2	Plant section engineering office	Before 1924	Pattern storage (1924-1940), commissary (1940-1950)
3	Locker	1938	Heating plant and wash room
4	Welding shop	Before 1924	Machine and blacksmith shop
5a	Storage shed	Before 1933	Storage
5b	Automobile and storage shed	1935	Storage

5c	Dock office	Before 1924	Locker room and utility storage
5d	Dock office added onto 5c	1939	Office
6	Machine shop	1944-45	
7	Oil and paint storage	1928-1940	Storage
8a	Carpenter and electrical shop	1939	Soils laboratory
8b	Carpenter and electrical shop	1943	
9	Former lumber and steel warehouse	1928, moved 1937, demolished 1967	Storage
10a	Garage	1937	Warehouse and garage
10b	Garage	Before 1911, moved 1937	Converted from blacksmith shop to warehouse and garage in 1924
11	District warehouse	1943	
12	Pattern storage	1938	
13	Material storage	1940	
14	Storage warehouse	1940-1945	
15	Dock derrick house	1940	
16	Former overseer’s quarters	1904	Demolished between 1963-1965
17	Former carpenter shop	Before 1925 at site 6, moved 1943	Demolished between 1961-1963
18	Former sales store	Before 1911, moved 1937, demolished 1961-1963	Pattern room, modified after move to shipping and receiving warehouse
19	Former flood control storehouse	Before 1936, demolished 1950	

The facility was originally constructed to provide port, supply, and repair facilities for the Districts’ dredges, hydrosurvey vessels, and other support vessels. Past operations associated with the repair and maintenance of vessels included sandblasting, paint removal, painting, overhaul of equipment, steam cleaning, welding and cutting, stockpiling and storage of fittings, and storage of dredge equipment and other materials for use on board the dredges. The Portland District also maintained a garage facility for motor vehicles at the LMO beginning in 1986. Servicing and maintenance of motor vehicles at the site ceased in 1988. Since 1986, the LMO has used the western half of the site for warehousing and storage of primarily large dredge parts and used surplus materials (USACE 1994a).

The Phase I PA indicated that various petroleum products, solvents, paints, and wood preservatives were historically used at the site. From interviews with personnel, it was noted that there was no knowledge of spills or releases before 1960. Spills since 1960 are listed in Section 8.3. There was no knowledge of on-site disposal of waste materials. Third-party recyclers collected waste oils and solvents. Inman Oil Company (Portland, OR) collected waste and spent oil between 1973 and 1993. In 1994, Spencer Environmental Services, Inc. (Oregon City, OR) began handling waste materials and spent oil for this site. The Phase I PA also noted that many controls were in place to store materials and prevent spills (i.e., use of spill pallets, waste tanks and barrels, and storage lockers). One 5,000-gallon fuel UST was located beneath a concrete slab at the west end of the garage. The tank passed all tightness testing requirements in 1990, and there was no history of leaking (USACE 1994a). This tank was removed and decommissioned in 1994 (USACE 2002).

8. CURRENT AND HISTORIC SOURCES AND COPCS

The understanding of historic and current potential upland and overwater sources at the site is summarized in Table 1. The following sections provide a brief overview of the potential sources and COPCs at the site requiring additional discussion.

8.1. Uplands

The PA (USACE 1994a) identified three upland areas of concern at the west end of the U.S. Moorings site based on past sandblasting and maintenance activities and subsequent soil chemistry data:

- Two distinct areas used for sandblasting with visible grit located near the LMO warehouse. COPCs include metals and butyltins.
- One area with visible oil staining adjacent to the river. COPCs include PAHs and possibly diesel-range or heavier-range oils.

A fourth smaller area was identified in the storage yard that was impacted by a 2-3-gallon spill of hydraulic oil.

In 1993, all impacted soil, including the small area impacted by the hydraulic oil spill, was removed. Sandblasting is no longer performed onsite (USACE 1994a). Table 1 shows all media impacted and COPCs associated with the historical and current activities.

8.2. Overwater Activities ☒ Yes ☐ No

The U.S. Moorings site includes a fixed dock (Docks A and B) for moorage of large vessels and ships and a floating dock (Dock C) for smaller vessels. While site uses include vessel maintenance and overhaul, the documents reviewed for this site indicate that the docks have been used primarily for moorage.

8.3. Spills

Known or documented spills at the U.S. Moorings site were obtained either from DEQ's Emergency Response Information System (ERIS) database for the period of 1995 to 2004, from oil and chemical spills recorded from 1982 to 2003 by the U.S. Coast Guard and the National Response Center's centralized federal database [see Appendix E of the Portland Harbor Work Plan (Integral et al. 2004)], from facility-specific technical reports, or from DEQ correspondence. These spills are summarized below.

Date	Material(s) Released	Volume Spilled (gallons)	Spill Surface (gravel, asphalt, sewer)	Action Taken (yes/no)
12/29/90	Sinking of anchor barge *Raggy* at its moorings - diesel / motor oil	350 (diesel)/ unknown (motor oil)	Overwater	yes
3/9/96	Unknown oil	unknown	Overwater	no
11/24/96	Oil slick of black fuel oil	unknown	Overwater	no
9/26/97	Propane	50 pounds	unknown	unknown
10/22/97	Sheen coming from underground source, bubbling up from sediments possibly due to disturbance by core sampling and subsequent prop wash	unknown	Overwater	no

9/30/99	Oil?	0.25	Overwater	Yes -booms/pads in place
3/16/00	Heavy oil being blown up river by wind - unknown source - very small amount - subsequently USACE determined one of their staff had spilled oil (tiny bit) while carrying a drain pan over a dock - will submit report	unknown	Overwater	no
1/24/03	Unknown	sheen	Overwater	unknown
6/27/03	Anonymous complaint – business mismanaging waste materials	-	-	-
10/7/03	Hydraulic oil	trace	Overwater	No – product dispersed
1/15/04	Hydraulic fluid (dredge)	10	Overwater	Yes – booms/ pads in place
2/6/04	Hydraulic oil (*Yaquina*)	<0.25	Overwater	Yes - pads

9. PHYSICAL SITE SETTING

Information regarding the geology and hydrogeology of the site was available in the PA report completed for the site (USACE 1994a). The PA report indicates that approximately eight borings were completed at the site as part of a geotechnical and "hazardous waste and toxic waste" investigation.

9.1. Geology

According to the PA report, recent alluvial soils cover the underlying Columbia River Basalt (CRB) at the site. The soils consist of predominantly discontinuous, interbedded sand and silty sand with lesser units of silty, sandy gravels, and sandy silts. At the southwestern corner of the site, CRB is estimated to be present at a depth of approximately 20 feet below ground surface. At the southeastern corner of the property, near the dock area shoreline, the CRB is estimated to be present at a depth of approximately 80 feet below ground surface. Near the northeastern corner of the property, CRB is estimated to be present at depths ranging from 60 to 70 feet below ground surface (USACE 1994a).

9.2. Hydrogeology

During the 1992 investigation, groundwater levels measured in geotechnical borings were approximately 2 feet higher than the Willamette River stage at the time of the measurements. The groundwater flow direction is likely toward the Willamette River (USACE 1994a).

10. NATURE AND EXTENT (*Current Understanding*)

The current understanding of the nature and extent of contamination for the uplands portions of the site is summarized in this section. When no data exist for a specific medium, a notation is made.

10.1. *Soil*

10.1.1. Upland Soil Investigations ☒ Yes ☐ No

On December 20, 1994, soil samples were collected north of the sandblasting areas, which were previously remediated in 1993 as part of a site evaluation requested by EPA (USACE 1994c). Eighteen soil samples (4 QA/QC samples included) were analyzed for 13 metals. Four samples were collected south of the sandblasting areas as background samples [see Supplemental Map 1 from USACE (1994c)]. Soil chemistry data are summarized in the table below.

			Duplicate			Background		Background	
Metal (mg/kg dry weight)	**#1**	**#2**	**#3**	**#4 (Dup of #3)**	**#7**	**#5**	**#6 (QA of #5)**	**#8**	**#9 (QA of #8)**
Antimony	ND	ND	ND	ND	ND	1.4	ND	ND	ND
Arsenic	ND	0.8	9	ND	1.7	2	1.6	3	1
Berilium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	5.6	ND	2.3	ND	2.3	<5	ND	4.5
Chromium	7.0	5.3	51	ND	15	20	13	14	13
Copper	12	3	66	46	37	24	17	16	14
Lead	2.8	ND	62	2.2	110	20	17	26	17
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	8.5	ND	26	ND	28	19	14	15	19
Selenium	ND	ND	ND	ND	ND	NA	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	52	43	209	43	73	82	84	50	55

Notes:
NA = Not available
ND = Not detected

10.1.2. Riverbank Samples ☐ Yes ☒ No

10.1.3. Summary

Metals (As, Cd, Cr, Cu, Pb, Ni and Zn) were detected within the top 6 inches of surface soil at both the remediated former sandblasting areas and background locations. Metals concentrations in the former sandblasting areas were generally detected at or above those measured in background locations.

10.2. *Groundwater*

10.2.1. Groundwater Investigations ☐ Yes ☒ No

The 1992 site investigation apparently included an assessment of groundwater levels and flow direction, but did not include any groundwater sampling (USACE 1994a).

10.2.2. NAPL (Historic & Current) ☐ Yes ☐ No

Groundwater impacts at the site, including the presence or absence of NAPL, are unknown.

10.2.3. Dissolved Contaminant Plumes ☐ Yes ☐ No

Groundwater impacts at the site are unknown.

Plume Characterization Status ☐ Complete ☐ Incomplete

Not applicable (N/A).

Plume Extent

N/A

Min/Max Detections (Current situation)

N/A

Current Plume Data

N/A

Preferential Pathways

No information has been presented regarding the depths of the utilities at the facility relative to the groundwater table, or if the utility and associated backfill may be a preferential groundwater flow pathway at the site.

Downgradient Plume Monitoring Points (min/max detections)

N/A

Visual Seep Sample Data ☐ Yes ☒ No

Available records indicate that no seeps have been identified at the site (GSI 2003).

Nearshore Porewater Data

Available records indicate that porewater data have not been collected at the site.

Groundwater Plume Temporal Trend

N/A

10.2.4. Summary

Groundwater samples have not been collected at the site to assess water quality. An RI work plan has been submitted to the EPA for review (Gross 2004, pers. comm.). The LWG has not been provided access to the work plan. The work plan may address data collection necessary to address the potential for a complete groundwater pathway based on known paints, solvents and oils used on site and based on the known former sandblasting activities (i.e., VOCs, TPH, SVOCs, metals).

10.3. Surface Water

10.3.1. Surface Water Investigation ☐ Yes ☒ No

10.3.2. General or Individual Stormwater Permit (Current or Past) ☒ Yes ☐ No

The eastern half of the site’s 13.14-acre area is covered by asphalt pavement and consists of five drainage areas as shown in Supplemental Drainage Map from USACE (2002). Drainage Areas 1 and 4 discharge to a 6-inch outfall (Outfall A) near Dock C. Drainage Areas 2 and 5 discharge through a 6-inch outfall (Outfall B) located near Dock B. It is not clear from the map how stormwater drains from Drainage Area 3. Stormwater associated with drainage areas 1, 2, 4, and 5; drains within some buildings; and the parking lot drains pass through 500-gallon oil/water separators before being discharged through Outfalls A and B into the river. No malfunction or overload of the oil/water separator system has occurred according to site personnel, and the system is maintained on an annual basis. All stormwater runoff from the U.S. Moorings is discharged into the Willamette River (DEQ 2004b). Other outfalls exist along the site's shoreline, as shown in Figure 1; however, it is not clear which outfalls correspond with Outfalls A and B shown in Supplemental Drainage Map from USACE (2002) (i.e., City of Portland outfall nomenclature can not be corroborated with the USACE nomenclature). In addition, some outfalls noted in Figure 1 may be associated with highway drains, as described in the Supplemental Drainage Map from USACE (2002).

Permit Type	File Number	Start Date	Outfalls[1]	Parameters/Frequency
1200Z	108394	10/2/02	Outfalls "A" and "B"	standard[2] /pH and TSS during storm events[3]
1200L	108394	8/1/94-9/30/96	Unknown	Unknown, permit is expired

[1] Outfalls are not labeled in the Storm Water Pollution Control Plan (USACE 2002).
[2] Standard GEN12Z permit requirements include pH, oil and grease, total suspended solids, copper, lead, and zinc. *E. coli* may also be required.
[3] A representative storm event is defined as an event that results in the accumulation of more than 0.1 inch of rainfall per day, and is preceded by at least 72 hours of dry weather.

Do other non-stormwater wastes discharge to the system? ☐ Yes ☒ No

10.3.3. Stormwater Data ☐ Yes ☒ No

10.3.4. Catch Basin Solids Data ☐ Yes ☒ No

10.3.5. Wastewater Permit ☐ Yes ☒ No

10.3.6. Wastewater Data ☐ Yes ☒ No

10.3.7. Summary

Stormwater infiltrates the ground in the western half of the site or is collected in catch basins distributed in five drainage basins in the eastern half of the site. Three outfalls receive stormwater from the five drainage areas and discharge directly into the Willamette River as shown in Supplemental Drainage Map from USACE (2002).

10.4. Sediment

10.4.1. River Sediment Data ☒ Yes ☐ No

Sediment data were collected off of the U.S. Moorings site as part of the following investigations:

- 1989 US Moorings Sediment Investigation (USACE 1990a)
- 1990 Columbia & Willamette Rivers Dioxin/Furan Eval. (USACE 1990b)
- 1994 US Moorings Sediment Investigation, June 14 (USACE 1994b)
- 1994 US Moorings Preliminary Assessment, December 20 (USACE 1994c)
- 1995 US Moorings Sediment Investigation, May 16 (USACE 1996)
- 1997 Portland Harbor Sediment Investigation (Weston 1998)

- 2000 Marine Financing XPA (Jacobs 2000)
- 2002 Lower Willamette Group Portland Harbor RI/FS Round 1 Site Characterization Report (Integral 2004).

Additional stations are proposed for LWG Round 2 sampling. Existing and proposed station locations are shown in Figure 1. Over 41surface samples and 18 subsurface samples have been collected, although not all samples were analyzed for all compounds. The data from all eight sampling investigations are summarized in Table 2.

10.4.2. Summary

See Final CSM Update.

11. CLEANUP HISTORY AND SOURCE CONTROL MEASURES

11.1. Soil Cleanup/Source Control

Soil Cleanup: Oil-stained soil from leaking equipment and barrels previously stored on the ground were removed in August 1993. At the same time, soil impacted by sandblasting in the storage yard was also removed (USACE 1994a). Approximately 200 tons of contaminated soil were removed and disposed of offsite (USACE 2002).

Source Control: Wastes generated from the site include both non-regulated and regulated materials and are characterized into spent oils, waste paint, paint/thinner, solvent/cleaners, water/others, antifreeze/water, and unknown/flammables. Inman Oil Co. of Portland Oregon, picked up waste and spent oil for 20 or more years prior to 1993 (USACE 1994a). Spencer Environmental Services, Inc. of Oregon City, Oregon, currently picks up and recycles oil from the site. The site is presently operating at a level comparable to a small quantity generator of hazardous waste. Spill containment pallets are currently being used under all liquids in storage. All stored waste is currently contained in DOT-approved 55-gallon drums, and those are placed on top of spill containment pallets. There is one building at the site that has a concrete slab floor with raised curb that is used as an oil products holding area. Oil booms are routinely placed around the dredges while they are in port. Environmental response equipment for the Corps is stored onsite in containers (USACE 1994a).

11.2. Groundwater Cleanup/Source Control

Available records indicate that no groundwater cleanup or source control activities have been conducted at the site.

11.3. Other

A 5,000-gallon steel UST for unleaded gasoline located on the west end of the garage building [see Supplemental Site Map from MSA (1990)] was decommissioned and removed in 1994 (DEQ 2004c). No evidence of releases from the UST was detected in the soil underneath the tank (DEQ 2004a). One reported oil and diesel fuel spill involving the sinking of a barge (*Raggy*) was cleaned up. No other documented spills or releases were found (USACE 1994a).

11.4. Potential for Recontamination from Upland Sources

See Final CSM Update.

12. BIBLIOGRAPHY / INFORMATION SOURCES

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Site Map (MSA 1990)
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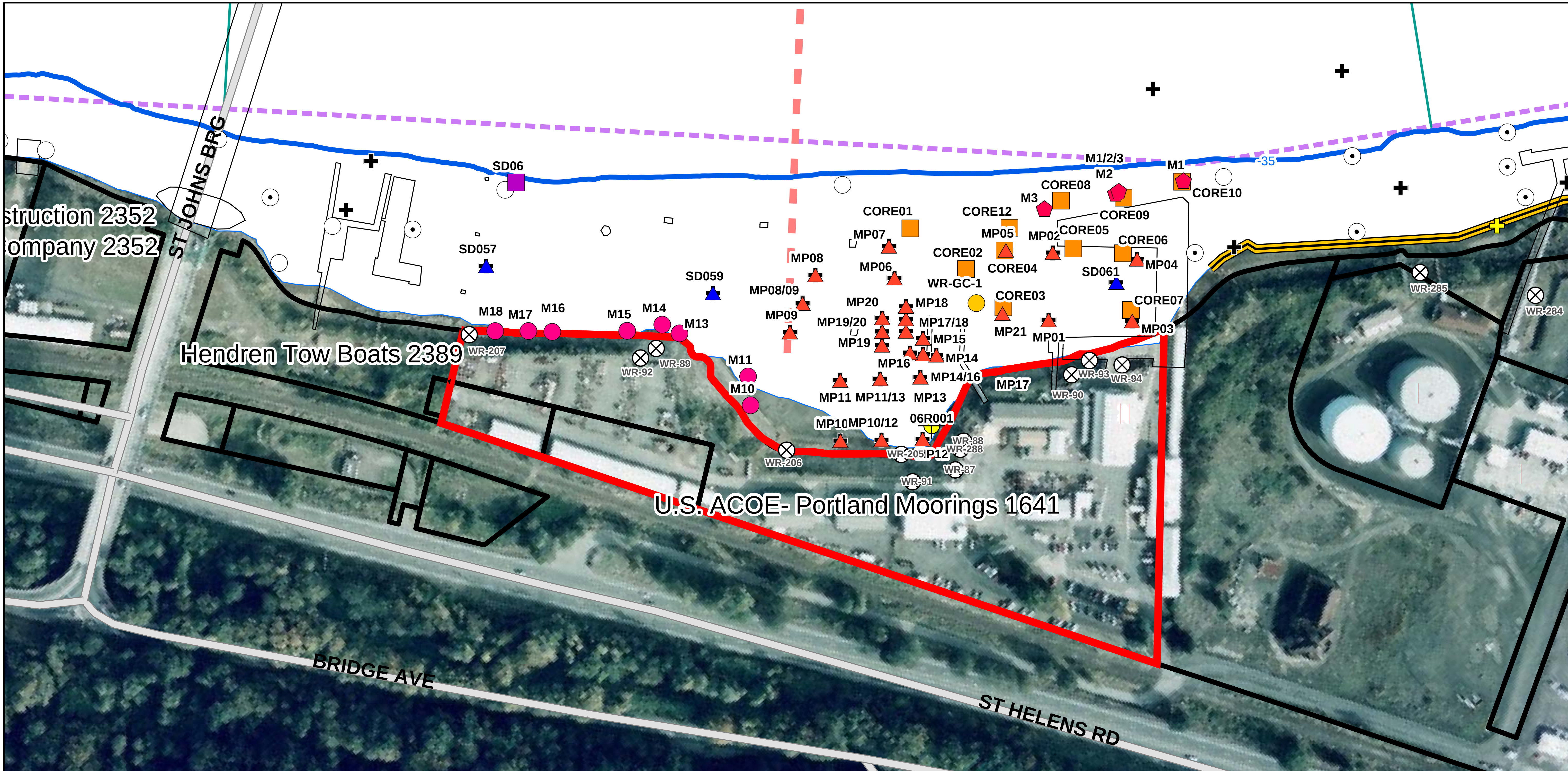
Figure 2. US Moorings Site Map and Building Designations (USACE 1994a)
Drainage Map (USACE 2002)
Map 1. Aerial Photograph with Sample Locations (December 20, 1994) (USACE 1994c)

FIGURES



USACE Portland Moorings Sediment Samples

Samples Queried from Historical Database for Inclusion in Table 2
site_code, reference

- COLWIL90, 1990 Columbia & Willamette Rivers Dioxin/Furan Evaluation (USACE 1990)
- MOOR0595, 1996 Moorings Sed. Inv. (USACE 1996)
- MOOR0694, 1994 Moorings Sed. Inv. (USACE 1994)
- MOOR1089, 1989 Moorings Sed. Inv. (USACE 1989)
- MOOR1294, 1995 Moorings PA (USACE 1995)
- WLCMFH00, Marine Finance XPA (Jacobs Eng. 2000)
- WR-WSI98, Portland Harbor SI (Weston 1998)

Samples Queried from Round 1 Database for Inclusion in Table 2

- Round 1 Sediment Samples

Round 1 and Historical Samples Not Queried for Inclusion in Table 2

- Round 1 Sediment Samples
- Historical Sediment Samples

integral consulting inc.

LWG Lower Willamette Group

Map Document: (C:\GIS\Projects\Portland_Harbor\
LWG-Map-Projects\Conseptual_Site_Model\Sample_Locations.mxd)
Plot Date: 03/08/2005

Areal Photo Date: October 2001.
Base Map features from Portland Metro's RLIS.

The City of Portland Outfall mapping information is based on available records; no warranty, expressed or implied, is provided as to the completeness or accuracy of the information. Current layer updated June 2004.

- City Outfalls
- City Outfalls (Abandoned)
- Non-City Outfalls
- Seep Photo Location (Not location of actual Seep)
- Selected ECSI Site Property Boundary
- -35ft. Contour (NAVD 88)
- River Miles
- Docks & In-water Structures
- Navigation Channel

Human Use Areas

- Dockside Worker
- Recreational Beach Use
- Transient

LWG Round 2 Proposed Sediment Samples

- Surface Sample Only
- Core & Surface Sample

0 100 200 400 Feet

DRAFT

DO NOT QUOTE OR CITE. This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Figure 1-Site Features
Portland Harbor RI/FS
Conceptual Site Model
USACE- Portland Moorings
ECSI 1641

TABLES

US Moorings #1641

Table 1. Potential Sources and Transport Pathways Assessment

Last Updated: March 4, 2005

Potential Sources	Media Impacted					COIs															Potential Complete Pathway				
						TPH			VOCs																
Description of Potential Source	Surface Soil	Subsurface Soil	Groundwater	Catch Basin Solids	River Sediment	Gasoline-Range	Diesel - Range	Heavier - Range	Petroleum-Related (e.g. BTEX)	VOCs	Chlorinated VOCs	SVOCs	PAHs	Phthalates	Phenolics	Metals	PCBs	Herbicides and Pesticides	Dioxins/Furans	Butyltins	Overland Transport	Groundwater	Direct Discharge - Overwater	Direct Discharge - Storm/Wastewater	Riverbank Erosion
Upland Areas																									
Sandblasting areas near LMO warehouses	✓															✓				✓	?			?	
Oil-stained soil in west end of property	✓						?	?					✓								?			?	
Overwater Areas																									
Historical sunken barge (removed)					✓		✓	✓															✓		
Other Areas/Other Issues																									

Notes:

[1] All information provided in this table is referenced in the site summaries. If information is not available or inconclusive, a ? may be used, as appropriate. No new information is provided in this table.

✓ = Source, COI are present or current or historic pathway is determined to be complete or potentially complete.

? = There is not enough information to determine if source or COI is present or if pathway is complete.

Blank = Source, COI and historic and current pathways have been investigated and shown to be not present or incomplete.

UST Underground storage tank
AST Above-ground storage tank
TPH Total petroleum hydrocarbons
VOCs Volatile organic compounds
SVOCs Semivolatile organic compounds
PAHs Polycyclic aromatic hydrocarbons
BTEX Benzene, toluene, ethylbenzene, and xylenes
PCBs Polychorinated biphenols

Table 2. Queried Sediment Chemistry Data.

Surface or Subsurface	Analyte	Number of Samples	Number Detected	% Detected	Detected Concentrations Minimum	Maximum	Mean	Median	95th	Detected and Nondetected Concentrations Minimum	Maximum	Mean	Median	95th
surface	Aroclor 1016 (ug/kg)	20	0	0						3.9 U	40 UH	33.5	40 UH	40 UH
surface	Aroclor 1242 (ug/kg)	20	0	0						3.9 U	80 UH	39	40 UH	80 UH
surface	Aroclor 1248 (ug/kg)	20	1	5	13 J	13 J	13	13 J	13 J	10 U	80 UH	39.5	40 UH	80 UH
surface	Aroclor 1254 (ug/kg)	20	1	5	14 J	14 J	14	14 J	14 J	10 U	90 UH	60.2	70 UH	80 UH
surface	Aroclor 1260 (ug/kg)	20	1	5	8 J	8 J	8	8 J	8 J	3.9 U	90 UH	46.9	40 UH	80 UH
surface	Aroclor 1221 (ug/kg)	20	0	0						7.9 U	300 UH	86.6	40 UH	300 UH
surface	Aroclor 1232 (ug/kg)	20	0	0						3.9 U	90 UH	45.5	40 UH	80 UH
surface	Polychlorinated biphenyls (ug/kg)	20	2	10	8 A	27 J	17.5	8 A	8 A	8 A	300 UA	96	80 UA	300 UA
surface	Butyltin ion (ug/kg)	19	16	84.2	2	39 G	15.1	12 G	26 G	2	39 G	13.6	12 G	26 G
surface	Dibutyltin ion (ug/kg)	19	16	84.2	5	120 G	41.9	36 G	80 G	5	120 G	36.2	30 G	80 G
surface	Dibutyltin ion (ug/l)	1	0	0						0.06 U	0.06 U	0.06	0.06 U	0.06 U
surface	Tributyltin ion (ug/kg)	19	19	100	12 J	410 G	118	94 G	240 G	12 J	410 G	118	94 G	240 G
surface	Tributyltin ion (ug/l)	1	0	0						0.02 UJ	0.02 UJ	0.02	0.02 UJ	0.02 UJ
surface	Tetrabutyltin (ug/kg)	4	0	0						3 U	5.8 U	5.03	5.6 U	5.7 U
surface	Tetrabutyltin (ug/l)	1	0	0						0.02 U	0.02 U	0.02	0.02 U	0.02 U
surface	Total solids (percent)	27	27	100	38	78.4	45.2	42.2	54.9	38	78.4	45.2	42.2	54.9
surface	Total organic carbon (percent)	20	20	100	1.2	3.53 J	2.79	3.09 J	3.48 J	1.2	3.53 J	2.79	3.09 J	3.48 J
surface	Acid Volatile Sulfides (mg/kg)	15	15	100	20 X	1100 X	135	46 X	250 X	20 X	1100 X	135	46 X	250 X
surface	Total sulfides (mg/kg)	15	15	100	16 G	720 G	86.9	29 G	170 G	16 G	720 G	86.9	29 G	170 G
surface	Total volatile solids (percent)	22	22	100	6.8 J	12.3	9.34	9.3 J	10.1 J	6.8 J	12.3	9.34	9.3 J	10.1 J
surface	2,3,7,8-Tetrachlorodibenzo-p-dioxin (ng/kg)	4	4	100	0.82	2	1.43	1.4	1.5	0.82	2	1.43	1.4	1.5
surface	1,2,3,7,8-Pentachlorodibenzo-p-dioxin (ng/kg)	4	4	100	1.3	3	2.03	1.7	2.1	1.3	3	2.03	1.7	2.1
surface	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (ng/kg)	4	4	100	2.2	5.2	3.53	3.2	3.5	2.2	5.2	3.53	3.2	3.5
surface	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (ng/kg)	4	4	100	8.4	21	14.9	14	16	8.4	21	14.9	14	16
surface	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (ng/kg)	4	4	100	4.7	10	6.9	6.1	6.8	4.7	10	6.9	6.1	6.8
surface	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (ng/kg)	4	4	100	170	400	298	260	360	170	400	298	260	360
surface	Octachlorodibenzo-p-dioxin (ng/kg)	4	4	100	1500	7500	3450	2300	2500	1500	7500	3450	2300	2500
surface	2,3,7,8-Tetrachlorodibenzofuran (ng/kg)	4	4	100	10	17	14.5	15	16	10	17	14.5	15	16
surface	1,2,3,7,8-Pentachlorodibenzofuran (ng/kg)	4	4	100	13	33	21.5	17	23	13	33	21.5	17	23
surface	2,3,4,7,8-Pentachlorodibenzofuran (ng/kg)	4	4	100	9.1	19	13.8	12	15	9.1	19	13.8	12	15
surface	1,2,3,4,7,8-Hexachlorodibenzofuran (ng/kg)	4	4	100	20	45	33.8	34	36	20	45	33.8	34	36
surface	1,2,3,6,7,8-Hexachlorodibenzofuran (ng/kg)	4	4	100	6.4	15	10.9	10	12	6.4	15	10.9	10	12
surface	1,2,3,7,8,9-Hexachlorodibenzofuran (ng/kg)	4	4	100	3.3	7.3	5.48	5.5	5.8	3.3	7.3	5.48	5.5	5.8
surface	2,3,4,6,7,8-Hexachlorodibenzofuran (ng/kg)	4	4	100	3.6	6.8	5.53	5	6.7	3.6	6.8	5.53	5	6.7
surface	1,2,3,4,6,7,8-Heptachlorodibenzofuran (ng/kg)	4	4	100	33	90	59.8	58	58	33	90	59.8	58	58
surface	1,2,3,4,7,8,9-Heptachlorodibenzofuran (ng/kg)	4	4	100	5.6	9.8	8.28	8.7	9	5.6	9.8	8.28	8.7	9
surface	Octachlorodibenzofuran (ng/kg)	4	4	100	87	280	157	130	130	87	280	157	130	130
surface	Gravel (percent)	4	4	100	0.01	2.7	0.855	0.03	0.68	0.01	2.7	0.855	0.03	0.68
surface	Sand (percent)	25	25	100	6.6 J	49.3 J	16.3	12.2 J	27.9	6.6 J	49.3 J	16.3	12.2 J	27.9
surface	Very coarse sand (percent)	1	1	100	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26
surface	Coarse sand (percent)	1	1	100	2.48	2.48	2.48	2.48	2.48	2.48	2.48	2.48	2.48	2.48
surface	Medium sand (percent)	1	1	100	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
surface	Fine sand (percent)	1	1	100	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02	9.02
surface	Very fine sand (percent)	1	1	100	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7
surface	Fines (percent)	25	25	100	50.7 J	93.4 J	83.7	87.8 J	92.1 J	50.7 J	93.4 J	83.7	87.8 J	92.1 J
surface	Silt (percent)	25	25	100	45.5 J	80.7 J	72.3	74.8 J	79.2 J	45.5 J	80.7 J	72.3	74.8 J	79.2 J

Table 2. Queried Sediment Chemistry Data.

Surface or Subsurface	Analyte	Number of Samples	Number Detected	% Detected	Detected Concentrations Minimum	Maximum	Mean	Median	95th	Detected and Nondetected Concentrations Minimum	Maximum	Mean	Median	95th
surface	Coarse silt (percent)	1	1	100	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1
surface	Medium silt (percent)	1	1	100	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9
surface	Fine silt (percent)	1	1	100	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75
surface	Very fine silt (percent)	1	1	100	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59
surface	Clay (percent)	25	25	100	4	15.8 J	11.3	12 J	13.7 J	4	15.8 J	11.3	12 J	13.7 J
surface	8-9 Phi clay (percent)	1	1	100	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
surface	9-10 Phi clay (percent)	1	0	0						0.01 U	0.01 U	0.01	0.01 U	0.01 U
surface	>10 Phi clay (percent)	1	1	100	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59
surface	Mean grain size (mm)	21	21	100	0.02	0.096	0.0331	0.027	0.044	0.02	0.096	0.0331	0.027	0.044
surface	Mean grain size (percent)	1	1	100	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
surface	Median grain size (mm)	21	21	100	0.016	0.062	0.0227	0.021	0.025	0.016	0.062	0.0227	0.021	0.025
surface	Median grain size (percent)	1	1	100	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
surface	Dalapon (ug/kg)	1	0	0						59 U	59 U	59	59 U	59 U
surface	Dicamba (ug/kg)	1	0	0						3.3 U	3.3 U	3.3	3.3 U	3.3 U
surface	MCPA (ug/kg)	1	0	0						3300 U	3300 U	3300	3300 U	3300 U
surface	Dichloroprop (ug/kg)	1	0	0						6.5 UJ	6.5 UJ	6.5	6.5 UJ	6.5 UJ
surface	2,4-D (ug/kg)	1	0	0						6.5 U	6.5 U	6.5	6.5 U	6.5 U
surface	Silvex (ug/kg)	1	0	0						1.6 UJ	1.6 UJ	1.6	1.6 UJ	1.6 UJ
surface	2,4,5-T (ug/kg)	1	0	0						1.6 UJ	1.6 UJ	1.6	1.6 UJ	1.6 UJ
surface	2,4-DB (ug/kg)	1	0	0						33 U	33 U	33	33 U	33 U
surface	Dinoseb (ug/kg)	1	0	0						3.3 UJ	3.3 UJ	3.3	3.3 UJ	3.3 UJ
surface	MCPP (ug/kg)	1	0	0						3300 U	3300 U	3300	3300 U	3300 U
surface	Aluminum (mg/kg)	4	4	100	26700	41500	36700	37500	40900	26700	41500	36700	37500	40900
surface	Aluminum (mg/l)	1	1	100	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
surface	Antimony (mg/kg)	12	1	8.33	0.14	0.14	0.14	0.14	0.14	0.14	24 U	14.5	17 U	24 U
surface	Antimony (mg/l)	1	0	0						0.05 U	0.05 U	0.05	0.05 U	0.05 U
surface	Arsenic (mg/kg)	29	26	89.7	1.5	60	5.87	3.5	6	1.5	60	5.81	3.6	6 U
surface	Arsenic (mg/l)	1	1	100	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
surface	Cadmium (mg/kg)	29	21	72.4	0.21	4.8	0.541	0.32	0.43	0.21	4.8 U	1.51	0.33	4.8
surface	Cadmium (mg/l)	1	0	0						0.002 U	0.002 U	0.002	0.002 U	0.002 U
surface	Chromium (mg/kg)	29	29	100	23	130	37.5	30	56.4	23	130	37.5	30	56.4
surface	Chromium (mg/l)	1	0	0						0.005 U	0.005 U	0.005	0.005 U	0.005 U
surface	Copper (mg/kg)	29	29	100	29	140	49.5	46.2	58.9	29	140	49.5	46.2	58.9
surface	Copper (mg/l)	1	0	0						0.002 U	0.002 U	0.002	0.002 U	0.002 U
surface	Lead (mg/kg)	30	30	100	9	100	34.4	29.2	68	9	100	34.4	29.2	68
surface	Lead (mg/l)	1	0	0						0.001 U	0.001 U	0.001	0.001 U	0.001 U
surface	Manganese (mg/kg)	3	3	100	588	668	625	619	619	588	668	625	619	619
surface	Manganese (mg/l)	1	1	100	7.57	7.57	7.57	7.57	7.57	7.57	7.57	7.57	7.57	7.57
surface	Mercury (mg/kg)	29	19	65.5	0.04	0.13	0.0921	0.1	0.11	0.04	0.2 U	0.118	0.1	0.2 U
surface	Mercury (mg/l)	1	0	0						0.0001 U	0.0001 U	0.0001	0.0001 U	0.0001 U
surface	Nickel (mg/kg)	29	29	100	18	50	25.3	22.9	33	18	50	25.3	22.9	33
surface	Nickel (mg/l)	1	0	0						0.01 U	0.01 U	0.01	0.01 U	0.01 U
surface	Selenium (mg/kg)	14	3	21.4	11	14	12.7	13	13	0.33 U	14	3.43	1 U	13
surface	Selenium (mg/l)	1	0	0						0.001 U	0.001 U	0.001	0.001 U	0.001 U
surface	Silver (mg/kg)	29	20	69	0.07	1	0.443	0.39	0.9	0.07	4.8 U	1.48	0.43	4.5 U
surface	Silver (mg/l)	1	0	0						0.0002 U	0.0002 U	0.0002	0.0002 U	0.0002 U

Table 2. Queried Sediment Chemistry Data.

Surface or Subsurface	Analyte	Number of Samples	Number Detected	% Detected	Detected Concentrations Minimum	Maximum	Mean	Median	95th	Detected and Nondetected Concentrations Minimum	Maximum	Mean	Median	95th
surface	Thallium (mg/kg)	13	2	15.4	0.1	6	3.05	0.1	0.1	0.1	48 U	26.2	33 U	48 U
surface	Thallium (mg/l)	1	0	0						0.001 U	0.001 U	0.001	0.001 U	0.001 U
surface	Zinc (mg/kg)	29	29	100	86	638	132	110	147	86	638	132	110	147
surface	Zinc (mg/l)	1	1	100	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
surface	Barium (mg/kg)	3	3	100	171	177	174	174	174	171	177	174	174	174
surface	Barium (mg/l)	1	1	100	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096
surface	Beryllium (mg/kg)	13	4	30.8	0.55	0.7	0.645	0.63	0.7	0.55	4.8 U	2.74	3.3 U	4.8 U
surface	Beryllium (mg/l)	1	0	0						0.001 U	0.001 U	0.001	0.001 U	0.001 U
surface	Calcium (mg/kg)	3	3	100	8210 J	8670 J	8500	8610 J	8610 J	8210 J	8670 J	8500	8610 J	8610 J
surface	Calcium (mg/l)	1	1	100	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3
surface	Cobalt (mg/kg)	3	3	100	17.7	18.6	18.2	18.4	18.4	17.7	18.6	18.2	18.4	18.4
surface	Cobalt (mg/l)	1	1	100	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
surface	Iron (mg/kg)	3	3	100	39900	43200	41600	41700	41700	39900	43200	41600	41700	41700
surface	Iron (mg/l)	1	1	100	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
surface	Magnesium (mg/kg)	3	3	100	6700	7000	6890	6980	6980	6700	7000	6890	6980	6980
surface	Magnesium (mg/l)	1	1	100	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
surface	Potassium (mg/kg)	3	3	100	1190	1360	1300	1350	1350	1190	1360	1300	1350	1350
surface	Potassium (mg/l)	1	1	100	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
surface	Sodium (mg/kg)	3	3	100	1100	1220	1170	1190	1190	1100	1220	1170	1190	1190
surface	Sodium (mg/l)	1	1	100	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4
surface	Titanium (mg/kg)	3	3	100	1910	2110	2000	1980	1980	1910	2110	2000	1980	1980
surface	Vanadium (mg/kg)	3	3	100	100	110	105	105	105	100	110	105	105	105
surface	Vanadium (mg/l)	1	0	0						0.003 U	0.003 U	0.003	0.003 U	0.003 U
surface	2-Methylnaphthalene (ug/kg)	21	16	76.2	10 J	9750	708	99	330 G	10 J	9750	551	60	230
surface	Acenaphthene (ug/kg)	21	21	100	63	1300	381	270	750	63	1300	381	270	750
surface	Acenaphthylene (ug/kg)	21	16	76.2	24	350	110	88	190	19 U	350	105	77 G	190
surface	Anthracene (ug/kg)	21	21	100	46 J	9900	899	420	920	46 J	9900	899	420	920
surface	Fluorene (ug/kg)	21	21	100	35	10300	749	160	640	35	10300	749	160	640
surface	Naphthalene (ug/kg)	21	21	100	19 J	7940	492	100	280	19 J	7940	492	100	280
surface	Phenanthrene (ug/kg)	21	21	100	150 J	61700	4770	1200	5100	150 J	61700	4770	1200	5100
surface	Low Molecular Weight PAH (ug/kg)	21	21	100	375 A	90970 A	7370	2089 A	8360 A	375 A	90970 A	7370	2089 A	8360 A
surface	Dibenz(a,h)anthracene (ug/kg)	21	21	100	20 J	880	274	234	500	20 J	880	274	234	500
surface	Benz(a)anthracene (ug/kg)	21	21	100	100	9710	1850	1300	3300	100	9710	1850	1300	3300
surface	Benzo(a)pyrene (ug/kg)	21	21	100	120	7790	1970	1800	3000	120	7790	1970	1800	3000
surface	Benzo(b)fluoranthene (ug/kg)	6	6	100	95	6470	1560	170	2200 J	95	6470	1560	170	2200 J
surface	Benzo(g,h,i)perylene (ug/kg)	21	21	100	97	6570	1190	930	1800	97	6570	1190	930	1800
surface	Benzo(k)fluoranthene (ug/kg)	6	6	100	44	5930	1380	170	1800 J	44	5930	1380	170	1800 J
surface	Chrysene (ug/kg)	21	21	100	130	11200	2100	1500	3500	130	11200	2100	1500	3500
surface	Fluoranthene (ug/kg)	21	21	100	210 J	37600	5190	2800	11000	210 J	37600	5190	2800	11000
surface	Indeno(1,2,3-cd)pyrene (ug/kg)	21	21	100	79	9900	2180	1600	4900	79	9900	2180	1600	4900
surface	Pyrene (ug/kg)	21	21	100	240 J	43400	5250	2600	9200	240 J	43400	5250	2600	9200
surface	Benzo(b+k)fluoranthene (ug/kg)	20	20	100	174 A	12400 A	3120	2400	7600	174 A	12400 A	3120	2400	7600
surface	High Molecular Weight PAH (ug/kg)	21	21	100	1101 A	135920 A	23200	16464 A	37090 A	1101 A	135920 A	23200	16464 A	37090 A
surface	Polycyclic Aromatic Hydrocarbons (ug/kg)	20	20	100	1589 A	226890 A	31100	17960 A	60090 A	1589 A	226890 A	31100	17960 A	60090 A
surface	2,4'-DDD (ug/kg)	1	0	0						1.8 U	1.8 U	1.8	1.8 U	1.8 U
surface	2,4'-DDE (ug/kg)	1	0	0						4.4 U	4.4 U	4.4	4.4 U	4.4 U

Table 2. Queried Sediment Chemistry Data.

Surface or Subsurface	Analyte	Number of Samples	Number Detected	% Detected	Detected Concentrations Minimum	Detected Concentrations Maximum	Detected Concentrations Mean	Detected Concentrations Median	Detected Concentrations 95th	Detected and Nondetected Concentrations Minimum	Detected and Nondetected Concentrations Maximum	Detected and Nondetected Concentrations Mean	Detected and Nondetected Concentrations Median	Detected and Nondetected Concentrations 95th
surface	2,4'-DDT (ug/kg)	1	0	0						0.88 UJ	0.88 UJ	0.88	0.88 UJ	0.88 UJ
surface	4,4'-DDD (ug/kg)	18	18	100	4.1	1200	88.9	20 H	40 H	4.1	1200	88.9	20 H	40 H
surface	4,4'-DDE (ug/kg)	18	18	100	2.4	100	9.82	5 H	6 H	2.4	100	9.82	5 H	6 H
surface	4,4'-DDT (ug/kg)	18	18	100	4 HJ	2500	171	20 HJ	200 HJ	4 HJ	2500	171	20 HJ	200 HJ
surface	Total of 3 isomers: pp-DDT,-DDD,-DDE (ug/kg)	18	18	100	17.5 A	3800 A	270	55 A	235 A	17.5 A	3800 A	270	55 A	235 A
surface	Aldrin (ug/kg)	18	1	5.56	60	60	60	60	60	0.2 U	60	6.68	4 UH	7 UH
surface	alpha-Hexachlorocyclohexane (ug/kg)	18	0	0						0.2 U	60 U	5.06	2 UH	2 UH
surface	beta-Hexachlorocyclohexane (ug/kg)	18	0	0						0.95 U	60 U	7.63	5 UH	5 UH
surface	delta-Hexachlorocyclohexane (ug/kg)	18	0	0						0.2 U	60 U	5.06	2 UH	2 UH
surface	gamma-Hexachlorocyclohexane (ug/kg)	18	1	5.56	540	540	540	540	540	0.2 U	540	33.5	2 UH	20 UH
surface	cis-Chlordane (ug/kg)	2	0	0						0.58 U	0.95 U	0.765	0.58 U	0.58 U
surface	trans-Chlordane (ug/kg)	1	0	0						1.9 U	1.9 U	1.9	1.9 U	1.9 U
surface	Oxychlordane (ug/kg)	1	0	0						0.42 U	0.42 U	0.42	0.42 U	0.42 U
surface	cis-Nonachlor (ug/kg)	1	0	0						0.54 U	0.54 U	0.54	0.54 U	0.54 U
surface	trans-Nonachlor (ug/kg)	1	0	0						0.39 U	0.39 U	0.39	0.39 U	0.39 U
surface	Dieldrin (ug/kg)	18	0	0						0.68 U	60 U	5.25	2 UH	4 UH
surface	alpha-Endosulfan (ug/kg)	18	0	0						0.33 U	60 U	5.07	2 UH	2 UH
surface	beta-Endosulfan (ug/kg)	18	0	0						0.39 U	60 U	5.57	2 UH	5 UH
surface	Endosulfan sulfate (ug/kg)	18	0	0						0.39 UJ	60 U	6.18	2 UH	7 UH
surface	Endrin (ug/kg)	18	0	0						0.39 U	60 U	5.35	2 UH	5 UH
surface	Endrin aldehyde (ug/kg)	18	0	0						0.39 U	60 U	5.35	2 UH	5 UH
surface	Endrin ketone (ug/kg)	2	0	0						0.39 U	1.9 U	1.15	0.39 U	0.39 U
surface	Heptachlor (ug/kg)	18	0	0						0.2 U	60 U	5.06	2 UH	2 UH
surface	Heptachlor epoxide (ug/kg)	18	0	0						0.2 U	60 U	5.06	2 UH	2 UH
surface	Methoxychlor (ug/kg)	18	0	0						2 U	300 U	36.9	20 UH	50 UH
surface	Mirex (ug/kg)	1	0	0						3.3 U	3.3 U	3.3	3.3 U	3.3 U
surface	Toxaphene (ug/kg)	18	0	0						20 U	12000 U	823	200 UH	200 UH
surface	gamma-Chlordane (ug/kg)	1	0	0						0.95 U	0.95 U	0.95	0.95 U	0.95 U
surface	Chlordane (cis & trans) (ug/kg)	16	0	0						50 UH	1000 U	123	70 UH	70 UH
surface	Diesel fuels (mg/kg)	1	0	0						110 U	110 U	110	110 U	110 U
surface	Gasoline (mg/kg)	1	0	0						40 U	40 U	40	40 U	40 U
surface	Residual Range Organics (mg/kg)	1	0	0						450 U	450 U	450	450 U	450 U
surface	2,3,4,6-Tetrachlorophenol (ug/kg)	1	0	0						100 U	100 U	100	100 U	100 U
surface	2,4,5-Trichlorophenol (ug/kg)	5	0	0						73 U	100 U	92.6	96 U	100 U
surface	2,4,6-Trichlorophenol (ug/kg)	5	0	0						73 U	100 U	92.6	96 U	100 U
surface	2,4-Dichlorophenol (ug/kg)	5	0	0						57 U	150 U	77	60 U	60 U
surface	2,4-Dimethylphenol (ug/kg)	20	0	0						19 U	290 U	95.4	100 U	100 U
surface	2,4-Dinitrophenol (ug/kg)	5	0	0						190 UJ	440 U	244	200 UJ	200 U
surface	2-Chlorophenol (ug/kg)	5	0	0						19 U	73 U	30.2	20 U	20 UJ
surface	2-Methylphenol (ug/kg)	20	0	0						19 U	290 U	93.4	100 U	100 U
surface	2-Nitrophenol (ug/kg)	5	0	0						73 U	100 U	92.6	96 U	100 U
surface	4,6-Dinitro-2-methylphenol (ug/kg)	5	0	0						190 U	290 U	214	200 U	200 U
surface	4-Chloro-3-methylphenol (ug/kg)	5	0	0						38 U	73 U	45.8	40 U	40 UJ
surface	4-Methylphenol (ug/kg)	19	3	15.8	190	300	257	280	280	20 U	300	121	100 U	280
surface	4-Nitrophenol (ug/kg)	5	0	0						94 U	150 U	108	100 U	100 UJ
surface	Pentachlorophenol (ug/kg)	20	0	0						50 UJ	440 U	227	250 U	250 U

Table 2. Queried Sediment Chemistry Data.

Surface or Subsurface	Analyte	Number of Samples	Number Detected	% Detected	Detected Concentrations Minimum	Maximum	Mean	Median	95th	Detected and Nondetected Concentrations Minimum	Maximum	Mean	Median	95th
surface	Phenol (ug/kg)	20	1	5	6 J	6 J	6	6 J	6 J	6 J	100 U	80.2	100 U	100 U
surface	2,3,4,5-Tetrachlorophenol (ug/kg)	1	0	0						100 U	100 U	100	100 U	100 U
surface	2,3,5,6-Tetrachlorophenol (ug/kg)	1	0	0						100 U	100 U	100	100 U	100 U
surface	3- and 4-Methylphenol Coelution (ug/kg)	1	0	0						290 U	290 U	290	290 U	290 U
surface	Dimethyl phthalate (ug/kg)	20	0	0						15 U	50 U	42.2	50 U	50 U
surface	Diethyl phthalate (ug/kg)	20	1	5	2 J	2 J	2	2 J	2 J	2 J	50 U	41.5	50 U	50 U
surface	Dibutyl phthalate (ug/kg)	20	0	0						19 U	50 U	43.2	50 U	50 U
surface	Butylbenzyl phthalate (ug/kg)	20	2	10	4 J	58	31	4 J	4 J	4 J	58	43.5	50 U	50 U
surface	Di-n-octyl phthalate (ug/kg)	20	0	0						19 U	290 U	55.9	50 U	50 U
surface	Bis(2-ethylhexyl) phthalate (ug/kg)	20	17	85	90 J	740	379	360 G	520	90 J	740	341	340	520
surface	Azobenzene (ug/kg)	1	0	0						20 U	20 U	20	20 U	20 U
surface	Bis(2-chloro-1-methylethyl) ether (ug/kg)	4	0	0						19 UJ	20 U	19.5	19 UJ	20 UJ
surface	2,4-Dinitrotoluene (ug/kg)	5	0	0						73 U	100 UJ	92.6	96 U	100 U
surface	2,6-Dinitrotoluene (ug/kg)	5	0	0						29 U	100 U	83.8	96 U	100 U
surface	2-Chloronaphthalene (ug/kg)	5	0	0						15 U	20 U	18.6	19 U	20 U
surface	2-Nitroaniline (ug/kg)	5	0	0						29 U	100 U	83.8	96 U	100 U
surface	3,3'-Dichlorobenzidine (ug/kg)	5	0	0						94 UJ	200 U	118	100 UJ	100 U
surface	3-Nitroaniline (ug/kg)	5	0	0						110 UJ	290 U	152	120 UJ	120 U
surface	4-Bromophenyl phenyl ether (ug/kg)	5	0	0						15 U	20 U	18.6	19 U	20 U
surface	4-Chloroaniline (ug/kg)	5	0	0						57 UJ	73 U	61.6	60 UJ	60 U
surface	4-Chlorophenyl phenyl ether (ug/kg)	5	0	0						15 U	20 U	18.6	19 U	20 U
surface	4-Nitroaniline (ug/kg)	5	0	0						94 UJ	150 U	108	100 UJ	100 U
surface	Aniline (ug/kg)	1	0	0						20 U	20 U	20	20 U	20 U
surface	Benzoic acid (ug/kg)	5	2	40	80 J	220	150	80 J	80 J	80 J	220	176	190 U	200 U
surface	Benzyl alcohol (ug/kg)	5	0	0						19 UJ	100 U	46.2	20 UJ	73 U
surface	Bis(2-chloroethoxy) methane (ug/kg)	5	0	0						19 U	29 U	21.4	20 U	20 U
surface	Bis(2-chloroethyl) ether (ug/kg)	5	0	0						15 U	40 U	34.2	38 U	40 U
surface	Carbazole (ug/kg)	5	5	100	9 J	220	111	77 J	210 J	9 J	220	111	77 J	210 J
surface	Dibenzofuran (ug/kg)	21	15	71.4	6 J	13900	998	72	180	6 J	13900	727	52	120
surface	Hexachlorobenzene (ug/kg)	5	0	0						0.31 U	20 U	14.7	19 U	19 U
surface	Hexachlorobutadiene (ug/kg)	5	0	0						0.2 UJ	20 U	14.6	19 U	19 U
surface	Hexachlorocyclopentadiene (ug/kg)	5	0	0						94 UJ	290 U	136	100 UJ	100 UJ
surface	Hexachloroethane (ug/kg)	5	0	0						10 U	59 U	25.4	19 U	20 U
surface	Isophorone (ug/kg)	5	0	0						15 U	20 U	18.6	19 U	20 U
surface	Nitrobenzene (ug/kg)	5	0	0						15 U	20 U	18.6	19 U	20 U
surface	N-Nitrosodimethylamine (ug/kg)	1	0	0						100 U	100 U	100	100 U	100 U
surface	N-Nitrosodipropylamine (ug/kg)	5	0	0						15 U	40 UJ	34.2	38 U	40 U
surface	N-Nitrosodiphenylamine (ug/kg)	5	0	0						15 U	20 U	18.6	19 U	20 U
surface	Bis(2-chloroisopropyl) ether (ug/kg)	1	0	0						15 U	15 U	15	15 U	15 U
surface	1,2-Dichlorobenzene (ug/kg)	5	0	0						15 U	20 U	18.6	19 U	20 U
surface	1,3-Dichlorobenzene (ug/kg)	5	0	0						15 U	20 U	18.6	19 U	20 U
surface	1,4-Dichlorobenzene (ug/kg)	5	0	0						15 U	20 UJ	18.6	19 U	20 U
surface	1,2,4-Trichlorobenzene (ug/kg)	5	0	0						15 U	20 UJ	18.6	19 U	20 U
subsurface	Aroclor 1016 (ug/kg)	2	0	0						10 U	20 U	15	10 U	10 U
subsurface	Aroclor 1242 (ug/kg)	5	0	0						10 U	60 U	42	60 U	60 U
subsurface	Aroclor 1248 (ug/kg)	5	0	0						10 U	60 U	42	60 U	60 U

Table 2. Queried Sediment Chemistry Data.

Surface or Subsurface	Analyte	Number of Samples	Number Detected	% Detected	Detected Concentrations Minimum	Maximum	Mean	Median	95th	Detected and Nondetected Concentrations Minimum	Maximum	Mean	Median	95th
subsurface	Aroclor 1254 (ug/kg)	5	0	0						10 U	60 U	42	60 U	60 U
subsurface	Aroclor 1260 (ug/kg)	5	0	0						10 U	60 U	42	60 U	60 U
subsurface	Aroclor 1221 (ug/kg)	2	0	0						20 U	40 U	30	20 U	20 U
subsurface	Aroclor 1232 (ug/kg)	2	0	0						10 U	20 U	15	10 U	10 U
subsurface	Polychlorinated biphenyls (ug/kg)	5	0	0						20 UA	60 UA	48	60 UA	60 UA
subsurface	Butyltin ion (ug/kg)	9	0	0						1 U	6 UJ	3.11	3 UGH	3 UGH
subsurface	Dibutyltin ion (ug/kg)	9	0	0						1 U	6 UJ	3.11	3 UH	3 UH
subsurface	Tributyltin ion (ug/kg)	9	0	0						1 U	6 U	3.11	3 UH	3 UH
subsurface	Tetrabutyltin (ug/kg)	2	0	0						3 U	6 U	4.5	3 U	3 U
subsurface	Total solids (percent)	42	42	100	45.9	64.7	54.9	54.8	61.1	45.9	64.7	54.9	54.8	61.1
subsurface	Total organic carbon (percent)	6	6	100	1.2	3.15	2.32	2.5	3.03	1.2	3.15	2.32	2.5	3.03
subsurface	Total sulfides (ug/g)	4	4	100	30.5	220.2	97	35.9	101.5	30.5	220.2	97	35.9	101.5
subsurface	Total volatile solids (percent)	16	16	100	7.5	18.3	9.32	8.6	11	7.5	18.3	9.32	8.6	11
subsurface	2,3,7,8-Tetrachlorodibenzo-p-dioxin (ng/kg)	8	2	25	0.96	1.2	1.08	0.96	0.96	0.64 U	1.2	0.904	0.8 U	1.2 UI
subsurface	1,2,3,7,8-Pentachlorodibenzo-p-dioxin (ng/kg)	8	5	62.5	0.79 T	1.9 T	1.32	1.1 T	1.7 T	0.79 T	1.9 T	1.41	1.3 U	1.9 UI
subsurface	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (ng/kg)	8	7	87.5	0.9 T	4.7	2.67	2.4	3.6 T	0.9 T	4.7	2.69	2.4	3.6 T
subsurface	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (ng/kg)	8	7	87.5	9	21	14.6	14	17	9	21	14.5	14	17
subsurface	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (ng/kg)	8	7	87.5	1.5 T	6.7	4.51	4.8	6.3	1.5 T	13 U	5.58	4.8	6.7
subsurface	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (ng/kg)	8	8	100	220	420	300	270	380	220	420	300	270	380
subsurface	Octachlorodibenzo-p-dioxin (ng/kg)	8	8	100	2300 B	6900 B	4150	3400	5700 B	2300 B	6900 B	4150	3400	5700 B
subsurface	2,3,7,8-Tetrachlorodibenzofuran (ng/kg)	8	8	100	2	62	34	27	57	2	62	34	27	57
subsurface	1,2,3,7,8-Pentachlorodibenzofuran (ng/kg)	8	8	100	2.6	150	55.6	34	90	2.6	150	55.6	34	90
subsurface	2,3,4,7,8-Pentachlorodibenzofuran (ng/kg)	8	8	100	9.3	62	31.8	23	52	9.3	62	31.8	23	52
subsurface	1,2,3,4,7,8-Hexachlorodibenzofuran (ng/kg)	8	8	100	13	270	100	78	140	13	270	100	78	140
subsurface	1,2,3,6,7,8-Hexachlorodibenzofuran (ng/kg)	8	8	100	11	65	28.3	22	36	11	65	28.3	22	36
subsurface	1,2,3,7,8,9-Hexachlorodibenzofuran (ng/kg)	8	8	100	2.5	48	15	10	17	2.5	48	15	10	17
subsurface	2,3,4,6,7,8-Hexachlorodibenzofuran (ng/kg)	8	7	87.5	3.2 J	16 J	9.71	9.5 J	15 J	1.9 U	16 J	8.74	9.1 J	15 J
subsurface	1,2,3,4,6,7,8-Heptachlorodibenzofuran (ng/kg)	8	8	100	74 J	370 J	155	130 J	160 J	74 J	370 J	155	130 J	160 J
subsurface	1,2,3,4,7,8,9-Heptachlorodibenzofuran (ng/kg)	8	8	100	3.4	40	19.8	21	30	3.4	40	19.8	21	30
subsurface	Octachlorodibenzofuran (ng/kg)	8	8	100	130	570	326	300	530	130	570	326	300	530
subsurface	Gravel (percent)	2	2	100	0.01	0.1	0.055	0.01	0.01	0.01	0.1	0.055	0.01	0.01
subsurface	Sand (percent)	17	17	100	4.2	81.1	20.1	12	37	4.2	81.1	20.1	12	37
subsurface	Fines (percent)	17	17	100	62.9	95.8	83.9	88	94.1	62.9	95.8	83.9	88	94.1
subsurface	Silt (percent)	17	17	100	48.6	79.1	68.1	70.1	78.3	48.6	79.1	68.1	70.1	78.3
subsurface	Clay (percent)	17	17	100	5.7	19.4	15.8	16.1	19.4	5.7	19.4	15.8	16.1	19.4
subsurface	Mean grain size (mm)	3	3	100	0.035	0.0684	0.0533	0.0564	0.0564	0.035	0.0684	0.0533	0.0564	0.0564
subsurface	Mean grain size (percent)	13	13	100	0.0197	0.06	0.0267	0.0233	0.0333	0.0197	0.06	0.0267	0.0233	0.0333
subsurface	Median grain size (mm)	3	3	100	0.021	0.03	0.025	0.024	0.024	0.021	0.03	0.025	0.024	0.024
subsurface	Median grain size (percent)	13	13	100	0.013	0.021	0.0175	0.017	0.02	0.013	0.021	0.0175	0.017	0.02
subsurface	Aluminum (mg/kg)	1	1	100	35400	35400	35400	35400	35400	35400	35400	35400	35400	35400
subsurface	Antimony (mg/kg)	1	1	100	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
subsurface	Arsenic (mg/kg)	6	5	83.3	3.66	5.28	4.35	4.41	4.7	3.66	5.28	4.29	4 U	4.7
subsurface	Cadmium (mg/kg)	6	6	100	0.15	0.44	0.358	0.39	0.44	0.15	0.44	0.358	0.39	0.44
subsurface	Chromium (mg/kg)	6	6	100	22.9	37	31.5	32	34	22.9	37	31.5	32	34
subsurface	Copper (mg/kg)	6	6	100	29.4	67	46.2	38	54	29.4	67	46.2	38	54
subsurface	Lead (mg/kg)	47	47	100	15.1	618	79.2	39	331	15.1	618	79.2	39	331

Table 2. Queried Sediment Chemistry Data.

Surface or Subsurface	Analyte	Number of Samples	Number Detected	% Detected	Detected Concentrations Minimum	Maximum	Mean	Median	95th	Detected and Nondetected Concentrations Minimum	Maximum	Mean	Median	95th
subsurface	Manganese (mg/kg)	1	1	100	524	524	524	524	524	524	524	524	524	524
subsurface	Mercury (mg/kg)	6	6	100	0.14	0.429	0.234	0.15	0.312	0.14	0.429	0.234	0.15	0.312
subsurface	Nickel (mg/kg)	6	6	100	20.5	39	30.4	29	37	20.5	39	30.4	29	37
subsurface	Selenium (mg/kg)	2	1	50	11	11	11	11	11	2.21 U	11	6.61	2.21 U	2.21 U
subsurface	Silver (mg/kg)	6	5	83.3	0.01	1.1	0.276	0.01	0.25	0.01 U	1.1	0.232	0.01	0.25
subsurface	Thallium (mg/kg)	2	2	100	0.06	7	3.53	0.06	0.06	0.06	7	3.53	0.06	0.06
subsurface	Zinc (mg/kg)	6	6	100	65.1	183	111	91.3	158	65.1	183	111	91.3	158
subsurface	Barium (mg/kg)	1	1	100	175	175	175	175	175	175	175	175	175	175
subsurface	Beryllium (mg/kg)	2	2	100	0.45	0.62	0.535	0.45	0.45	0.45	0.62	0.535	0.45	0.45
subsurface	Calcium (mg/kg)	1	1	100	7890	7890	7890	7890	7890	7890	7890	7890	7890	7890
subsurface	Cobalt (mg/kg)	1	1	100	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6
subsurface	Iron (mg/kg)	1	1	100	38900	38900	38900	38900	38900	38900	38900	38900	38900	38900
subsurface	Magnesium (mg/kg)	1	1	100	6700	6700	6700	6700	6700	6700	6700	6700	6700	6700
subsurface	Potassium (mg/kg)	1	1	100	1190	1190	1190	1190	1190	1190	1190	1190	1190	1190
subsurface	Sodium (mg/kg)	1	1	100	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040
subsurface	Titanium (mg/kg)	1	1	100	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
subsurface	Vanadium (mg/kg)	1	1	100	96.3	96.3	96.3	96.3	96.3	96.3	96.3	96.3	96.3	96.3
subsurface	2-Methylnaphthalene (ug/kg)	46	40	87	3 J	47600	6830	3700	21600	3 J	47600	5980	3050	19600
subsurface	Acenaphthene (ug/kg)	46	46	100	10 J	70800	7710	3880	22800	10 J	70800	7710	3880	22800
subsurface	Acenaphthylene (ug/kg)	46	17	37	10 J	3220	696	550	1390	10 J	3220	456	300 U	840
subsurface	Anthracene (ug/kg)	46	45	97.8	10 J	45600	6540	5100	15800	10 J	45600	6400	4980	15800
subsurface	Fluorene (ug/kg)	46	44	95.7	8 J	43600	5750	3610	13900	8 J	43600	5510	3450	13900
subsurface	Naphthalene (ug/kg)	46	45	97.8	10 J	57700	5630	2270	21000	10 J	57700	5520	2270	21000
subsurface	Phenanthrene (ug/kg)	46	46	100	82 J	284000	37700	21000	89800	82 J	284000	37700	21000	89800
subsurface	Low Molecular Weight PAH (ug/kg)	46	46	100	130 A	456000 A	63100	35940 A	158650 A	130 A	456000 A	63100	35940 A	158650 A
subsurface	Dibenz(a,h)anthracene (ug/kg)	46	37	80.4	200	7070	1190	840	2970	200	7070	1020	600	2600
subsurface	Benz(a)anthracene (ug/kg)	46	46	100	100	44200	7870	4700	22400	100	44200	7870	4700	22400
subsurface	Benzo(a)pyrene (ug/kg)	46	45	97.8	100 J	39100	7350	4600	17300	100 J	39100	7230	4330	17300
subsurface	Benzo(b)fluoranthene (ug/kg)	43	43	100	100 J	40300	6210	3570	17500	100 J	40300	6210	3570	17500
subsurface	Benzo(g,h,i)perylene (ug/kg)	46	46	100	200 J	39000	6400	3830	18300	200 J	39000	6400	3830	18300
subsurface	Benzo(k)fluoranthene (ug/kg)	43	43	100	60 J	30000	4910	3130	15300	60 J	30000	4910	3130	15300
subsurface	Chrysene (ug/kg)	46	46	100	100	46000	8540	5610	25700	100	46000	8540	5610	25700
subsurface	Fluoranthene (ug/kg)	46	46	100	360 J	148000	25500	15900	81600	360 J	148000	25500	15900	81600
subsurface	Indeno(1,2,3-cd)pyrene (ug/kg)	46	46	100	100 J	40900	6030	3230	17500	100 J	40900	6030	3230	17500
subsurface	Pyrene (ug/kg)	46	46	100	450 J	175000	30600	19600	90300	450 J	175000	30600	19600	90300
subsurface	Benzo(b+k)fluoranthene (ug/kg)	46	46	100	160 A	70300 A	10800	6410 A	32800 A	160 A	70300 A	10800	6410 A	32800 A
subsurface	High Molecular Weight PAH (ug/kg)	46	46	100	1570 A	549570 A	104000	64040 A	307240 A	1570 A	549570 A	104000	64040 A	307240 A
subsurface	Polycyclic Aromatic Hydrocarbons (ug/kg)	46	46	100	1700 A	981620 A	167000	96870 A	467400 A	1700 A	981620 A	167000	96870 A	467400 A
subsurface	4,4'-DDD (ug/kg)	45	40	88.9	20	2000	290	80	1200	2 U	2000	263	80	760
subsurface	4,4'-DDE (ug/kg)	45	31	68.9	2 J	70	20.8	9 J	40	2 J	80 U	22.7	9 J	60
subsurface	4,4'-DDT (ug/kg)	45	20	44.4	5 J	690	93.7	40	200	1 U	690	66.3	40	200 U
subsurface	Total of 3 isomers: pp-DDT,-DDD,-DDE (ug/kg)	45	42	93.3	5 A	2190 A	336	110 A	800 A	5 A	2190 A	321	110 A	800 A
subsurface	Aldrin (ug/kg)	45	13	28.9	4 J	20	7.08	6 J	9 J	0.99 U	100 U	13.5	4 J	40 U
subsurface	alpha-Hexachlorocyclohexane (ug/kg)	45	25	55.6	1 J	30	6.16	4 J	10	0.99 U	80 U	6.6	3 J	20
subsurface	beta-Hexachlorocyclohexane (ug/kg)	45	0	0						0.99 U	80 U	3.78	2 U	3 U
subsurface	delta-Hexachlorocyclohexane (ug/kg)	45	6	13.3	2 J	8 J	4.33	3 J	6 J	0.99 UJ	80 U	4.82	2 U	6 J

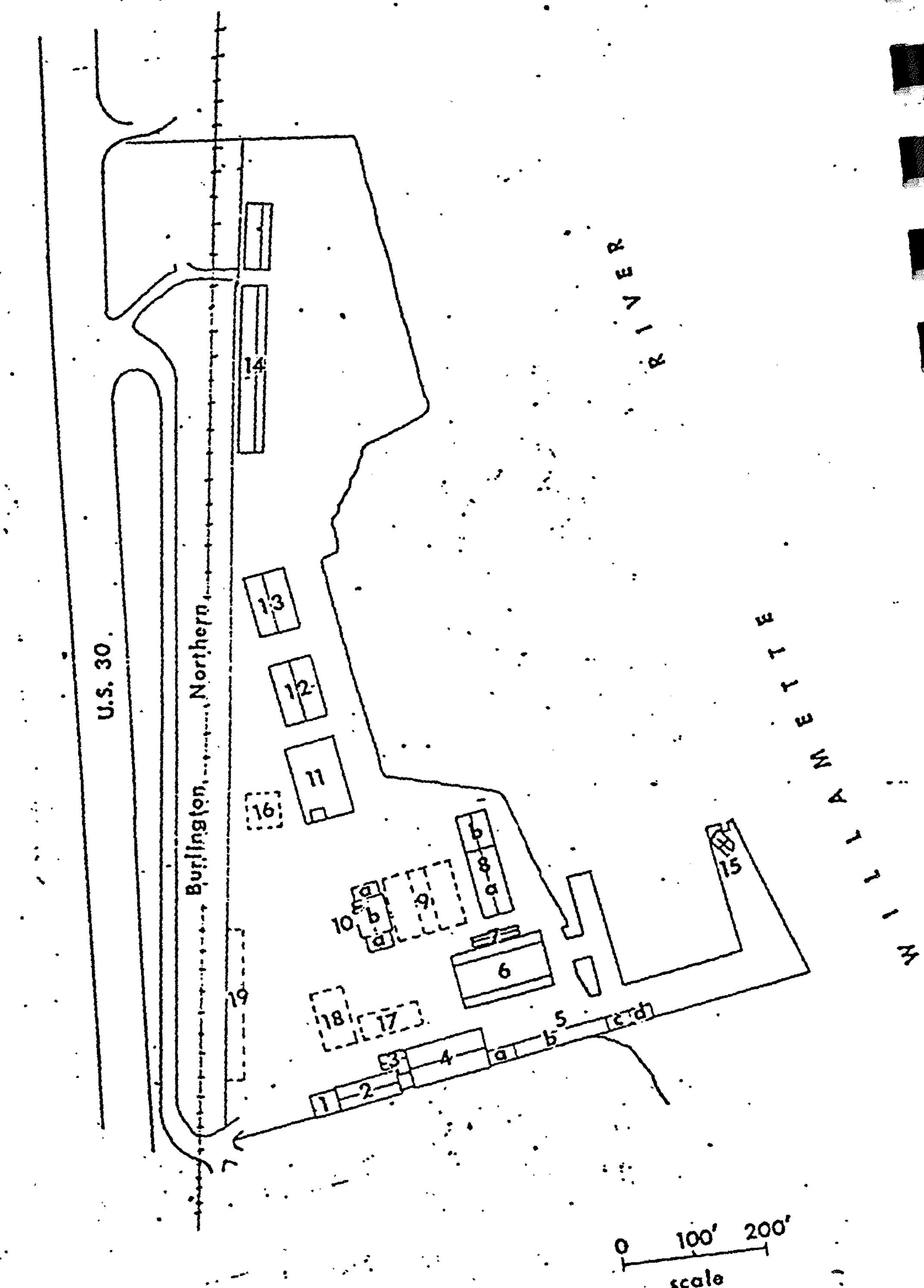
Table 2. Queried Sediment Chemistry Data.

Surface or Subsurface	Analyte	Number of Samples	Number Detected	% Detected	Detected Concentrations Minimum	Maximum	Mean	Median	95th	Detected and Nondetected Concentrations Minimum	Maximum	Mean	Median	95th
subsurface	gamma-Hexachlorocyclohexane (ug/kg)	45	17	37.8	2 J	360	75.9	20	300	0.99 U	360	33.9	1 U	200 U
subsurface	cis-Chlordane (ug/kg)	4	0	0						0.99 U	5 U	4	5 U	5 U
subsurface	Dieldrin (ug/kg)	45	7	15.6	0.003 J	29	9.43	7 J	11	0.003 J	80 U	10	2 U	60 U
subsurface	alpha-Endosulfan (ug/kg)	45	1	2.22	6 J	6 J	6	6 J	6 J	0.99 U	80 U	6.93	1 U	60 U
subsurface	beta-Endosulfan (ug/kg)	45	3	6.67	6 J	30	14.3	7 J	7 J	1 U	80 U	12.5	1 U	60 U
subsurface	Endosulfan sulfate (ug/kg)	45	0	0						2 U	80 U	12.8	2 U	60 U
subsurface	Endrin (ug/kg)	45	4	8.89	4 J	10	7	5	9 J	2 U	80 U	10.7	2 U	60 U
subsurface	Endrin aldehyde (ug/kg)	42	2	4.76	2 J	5 J	3.5	2 J	2 J	1 U	80 U	12.1	1 U	60 U
subsurface	Endrin ketone (ug/kg)	4	0	0						2 U	9 U	7.25	9 U	9 U
subsurface	Heptachlor (ug/kg)	45	4	8.89	2 J	6 J	4.5	5 J	5 J	0.99 U	80 U	4.07	1 U	5 J
subsurface	Heptachlor epoxide (ug/kg)	45	8	17.8	2 J	10	6.63	7 J	10	0.99 U	80 U	12.6	2 U	60 U
subsurface	Methoxychlor (ug/kg)	45	0	0						5 U	300 U	49.4	5 U	300 U
subsurface	Toxaphene (ug/kg)	45	0	0						51 U	20000 U	2550	2000 U	4000 U
subsurface	gamma-Chlordane (ug/kg)	4	0	0						0.99 U	5 U	4	5 U	5 U
subsurface	Chlordane (cis & trans) (ug/kg)	41	0	0						21 U	3000 U	294	21 U	900 U
subsurface	Diesel fuels (mg/kg)	1	0	0						97 U	97 U	97	97 U	97 U
subsurface	Gasoline (mg/kg)	1	0	0						20 U	20 U	20	20 U	20 U
subsurface	Residual Range Organics (mg/kg)	1	0	0						390 U	390 U	390	390 U	390 U
subsurface	2,4,5-Trichlorophenol (ug/kg)	5	0	0						74 U	2600 U	1490	2200 U	2500 U
subsurface	2,4,6-Trichlorophenol (ug/kg)	5	0	0						74 U	2600 U	1490	2200 U	2500 U
subsurface	2,4-Dichlorophenol (ug/kg)	5	0	0						60 U	1600 U	922	1300 U	1500 U
subsurface	2,4-Dimethylphenol (ug/kg)	5	0	0						20 U	1000 U	634	860 U	990 U
subsurface	2,4-Dinitrophenol (ug/kg)	5	0	0						200 UJ	5200 U	3030	4300 U	5000 U
subsurface	2-Chlorophenol (ug/kg)	5	0	0						20 U	520 U	309	430 U	500 U
subsurface	2-Methylphenol (ug/kg)	5	0	0						20 U	520 U	354	430 U	500 U
subsurface	2-Nitrophenol (ug/kg)	5	0	0						74 U	2600 U	1490	2200 U	2500 U
subsurface	4,6-Dinitro-2-methylphenol (ug/kg)	5	0	0						200 UJ	5200 U	3000	4300 U	5000 U
subsurface	4-Chloro-3-methylphenol (ug/kg)	5	0	0						40 U	1000 U	593	860 U	990 U
subsurface	4-Methylphenol (ug/kg)	4	1	25	85	85	85	85	85	85	520 U	384	430 U	500 U
subsurface	4-Nitrophenol (ug/kg)	5	0	0						99 U	2600 U	1510	2200 U	2500 U
subsurface	Pentachlorophenol (ug/kg)	5	0	0						99 U	2600 U	1570	2200 U	2500 U
subsurface	Phenol (ug/kg)	5	0	0						20 U	1000 U	589	860 U	990 U
subsurface	3- and 4-Methylphenol Coelution (ug/kg)	1	0	0						300 U	300 U	300	300 U	300 U
subsurface	Dimethyl phthalate (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	Diethyl phthalate (ug/kg)	5	1	20	3 J	3 J	3	3 J	3 J	3 J	520 U	295	430 U	500 U
subsurface	Dibutyl phthalate (ug/kg)	5	0	0						20 U	520 U	300	430 U	500 U
subsurface	Butylbenzyl phthalate (ug/kg)	5	0	0						20 U	520 U	300	430 U	500 U
subsurface	Di-n-octyl phthalate (ug/kg)	5	0	0						20 U	520 U	354	430 U	500 U
subsurface	Bis(2-ethylhexyl) phthalate (ug/kg)	5	0	0						31 U	3000 U	896	500 U	520 U
subsurface	Bis(2-chloro-1-methylethyl) ether (ug/kg)	4	0	0						20 U	520 U	368	430 U	500 U
subsurface	2,4-Dinitrotoluene (ug/kg)	5	0	0						74 U	2600 U	1490	2200 U	2500 U
subsurface	2,6-Dinitrotoluene (ug/kg)	5	0	0						30 U	2600 U	1490	2200 U	2500 U
subsurface	2-Chloronaphthalene (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	2-Nitroaniline (ug/kg)	5	0	0						30 U	2600 U	1490	2200 U	2500 U
subsurface	3,3'-Dichlorobenzidine (ug/kg)	5	0	0						99 U	2600 U	1520	2200 U	2500 U
subsurface	3-Nitroaniline (ug/kg)	5	0	0						120 U	2600 U	1540	2200 U	2500 U

Table 2. Queried Sediment Chemistry Data.

Surface or Subsurface	Analyte	Number of Samples	Number Detected	% Detected	Detected Concentrations Minimum	Maximum	Mean	Median	95th	Detected and Nondetected Concentrations Minimum	Maximum	Mean	Median	95th
subsurface	4-Bromophenyl phenyl ether (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	4-Chloroaniline (ug/kg)	5	0	0						60 U	1600 U	907	1300 U	1500 U
subsurface	4-Chlorophenyl phenyl ether (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	4-Nitroaniline (ug/kg)	5	0	0						99 U	2600 U	1510	2200 U	2500 U
subsurface	Benzoic acid (ug/kg)	5	2	40	50 J	240	145	50 J	50 J	50 J	5200 U	2960	4300 U	5000 U
subsurface	Benzyl alcohol (ug/kg)	5	0	0						20 U	2600 U	1480	2200 U	2500 U
subsurface	Bis(2-chloroethoxy) methane (ug/kg)	5	0	0						20 U	520 U	300	430 U	500 U
subsurface	Bis(2-chloroethyl) ether (ug/kg)	5	0	0						15 U	520 U	301	430 U	500 U
subsurface	Carbazole (ug/kg)	2	2	100	1 J	34	17.5	1 J	1 J	1 J	34	17.5	1 J	1 J
subsurface	Dibenzofuran (ug/kg)	46	34	73.9	2 J	4850	1010	770	2290	2 J	4850	823	590	1620
subsurface	Hexachlorobenzene (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	Hexachlorobutadiene (ug/kg)	5	0	0						15 U	1000 U	577	860 U	990 U
subsurface	Hexachlorocyclopentadiene (ug/kg)	5	0	0						99 U	2600 U	1540	2200 U	2500 U
subsurface	Hexachloroethane (ug/kg)	5	0	0						20 U	1000 U	586	860 U	990 U
subsurface	Isophorone (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	Nitrobenzene (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	N-Nitrosodipropylamine (ug/kg)	5	0	0						15 U	520 U	301	430 U	500 U
subsurface	N-Nitrosodiphenylamine (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	3,4,5-Trichloroguaiacol (ug/kg)	3	0	0						2200 U	2600 U	2430	2500 U	2500 U
subsurface	4,5,6-Trichloroguaiacol (ug/kg)	3	0	0						2200 U	2600 U	2430	2500 U	2500 U
subsurface	Bis(2-chloroisopropyl) ether (ug/kg)	1	0	0						15 U	15 U	15	15 U	15 U
subsurface	Guaiacol (ug/kg)	3	0	0						860 U	1000 U	950	990 U	990 U
subsurface	Tetrachloroguaiacol (ug/kg)	3	0	0						1300 U	1600 U	1470	1500 U	1500 U
subsurface	1,2-Dichlorobenzene (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	1,3-Dichlorobenzene (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	1,4-Dichlorobenzene (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U
subsurface	1,2,4-Trichlorobenzene (ug/kg)	5	0	0						15 U	520 U	297	430 U	500 U

SUPPLEMENTAL FIGURES



U.S. Government Moorings

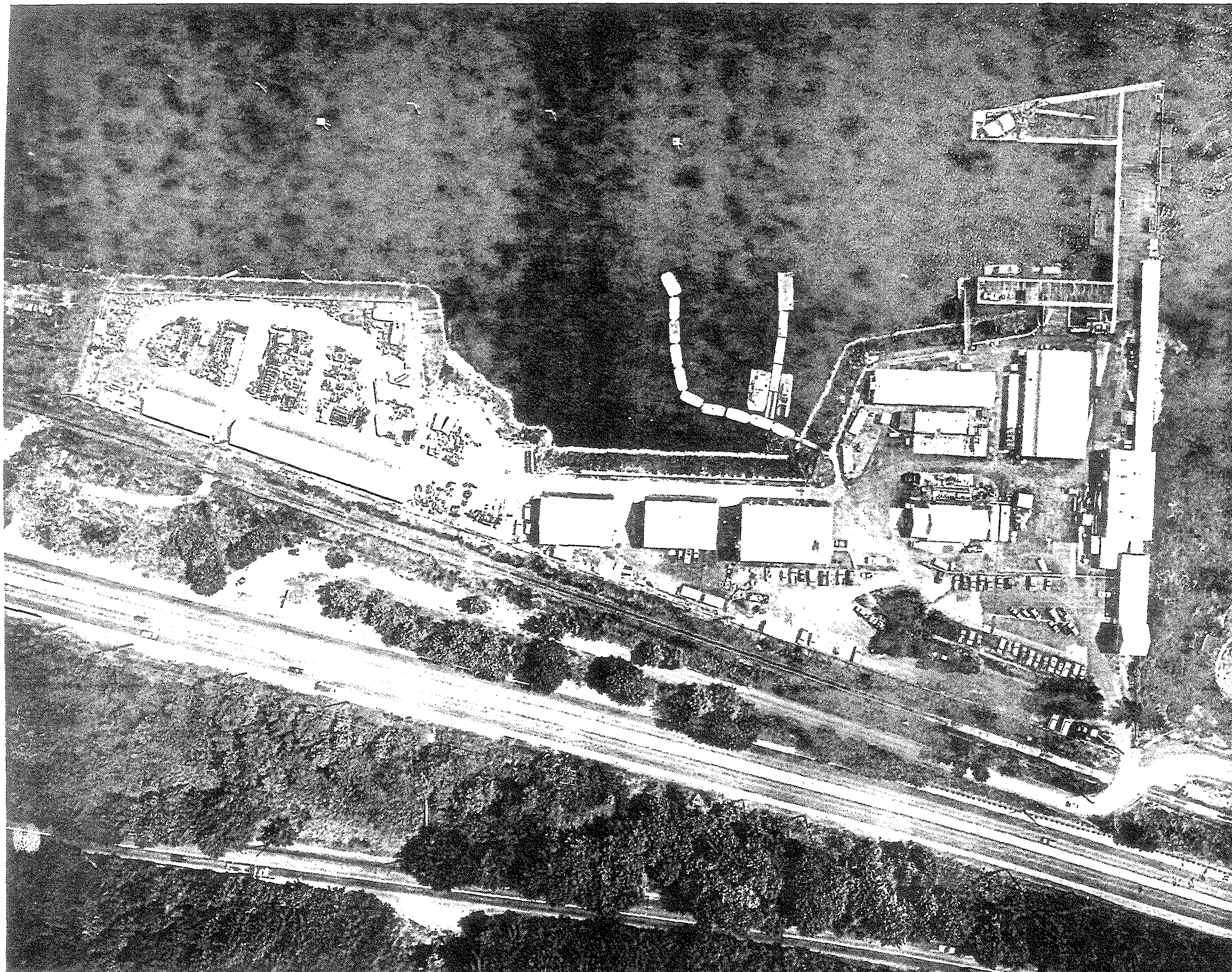
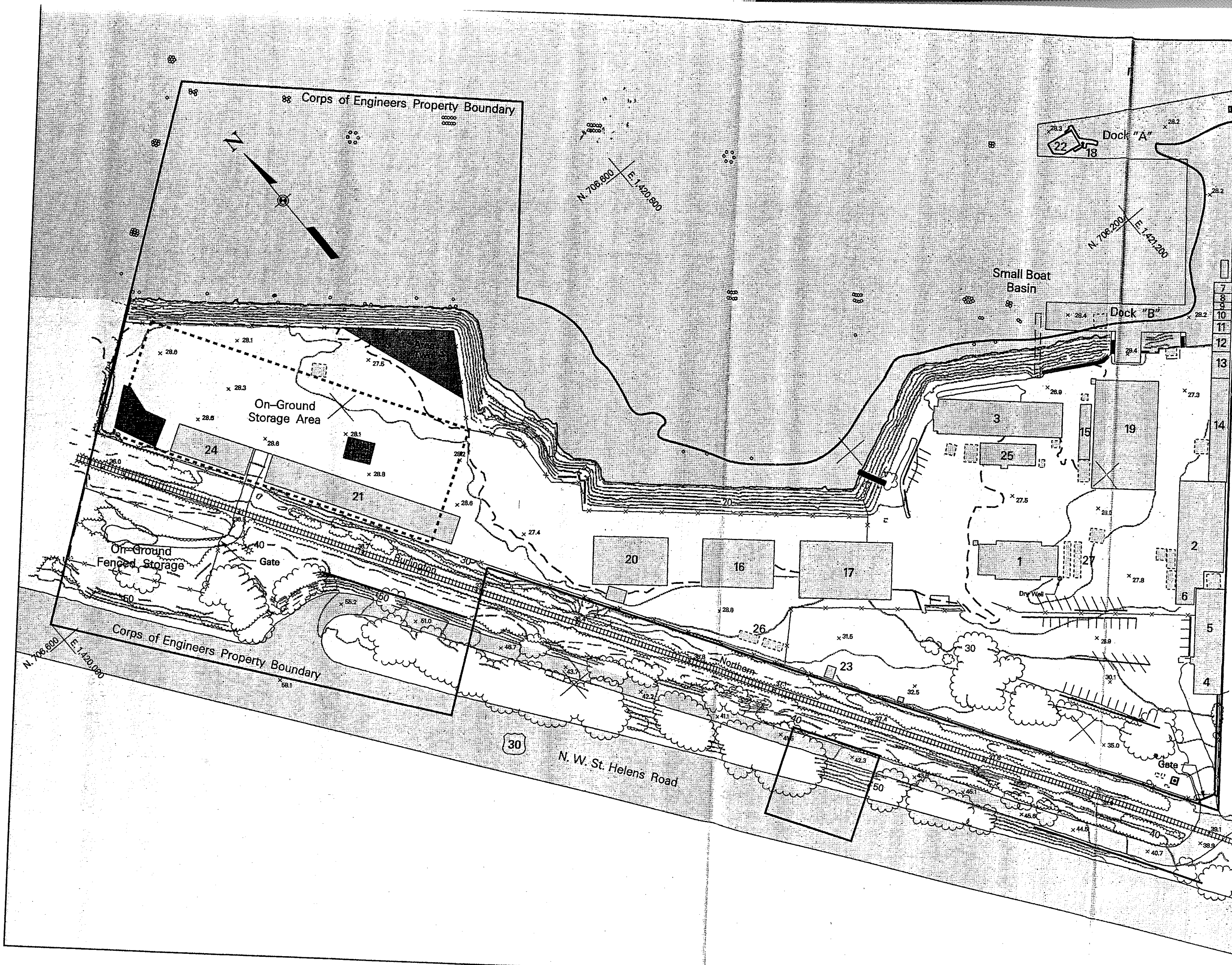


Figure 1, Aerial Photo of U. S. Moorings, Portland, Oregon. (11 June 1991)

U. S. MOORINGS

Figure 2



Project Features

- Temporary Location of Permanent Structure
- Dolphin
- 100 Year Flood Elevation (27.5')
- Corps of Engineers Property Boundary
- Fence Lines
- 1993 Cleanup Areas (Approx. Locations)
- Proposed LMO Warehouse Footprint (approx.)
- × 28.3 Spot Elevations

Building Designations

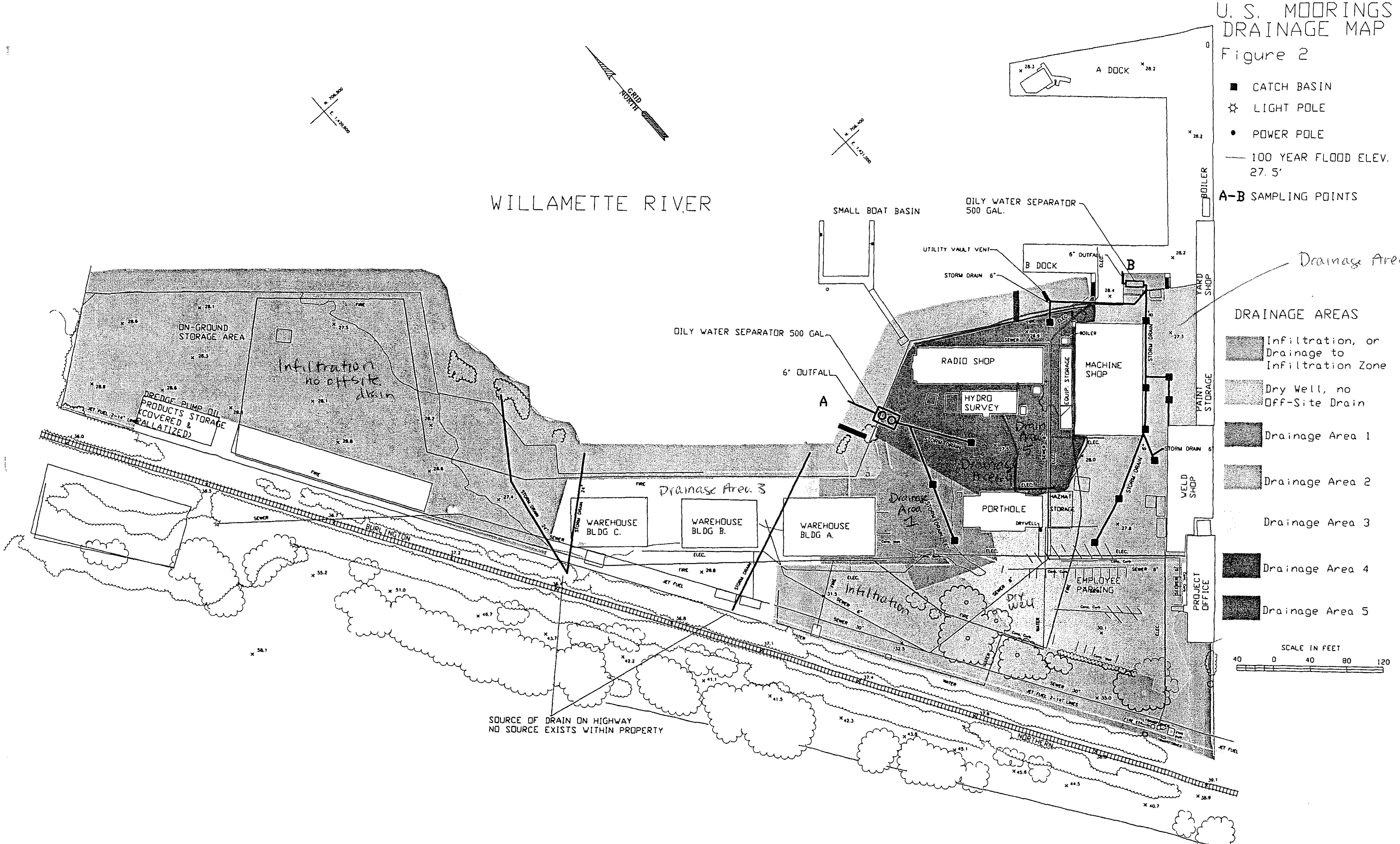
1 Training Room
2 Welding Shop
3 Carpentry and Electrical Shop
4 Plant Section Office
5 Plant Section Engineering Office
6 Locker and Rest Room
7 Dock Office
8 Lunch Room
9 Lunch Room
10 Rigging Storage Room
11 Electrical Equipment Room
12 Storage Room
13 Paint Shop
14 Dock Storage
15 Oil and Paint Storage
16 Logistics Warehouse Building B
17 Logistics Warehouse Building A
18 Dock Crane
19 Machine Shop
20 Logistics Warehouse Building C
21 Logistics Warehouse Building D
22 Crane House
23 Water Service
24 Logistics Warehouse Building E
25 Hyrographic Surveys Trailer
26 Hazardous Material Storage Lockers
27 Environmental Response Equipment Trailers

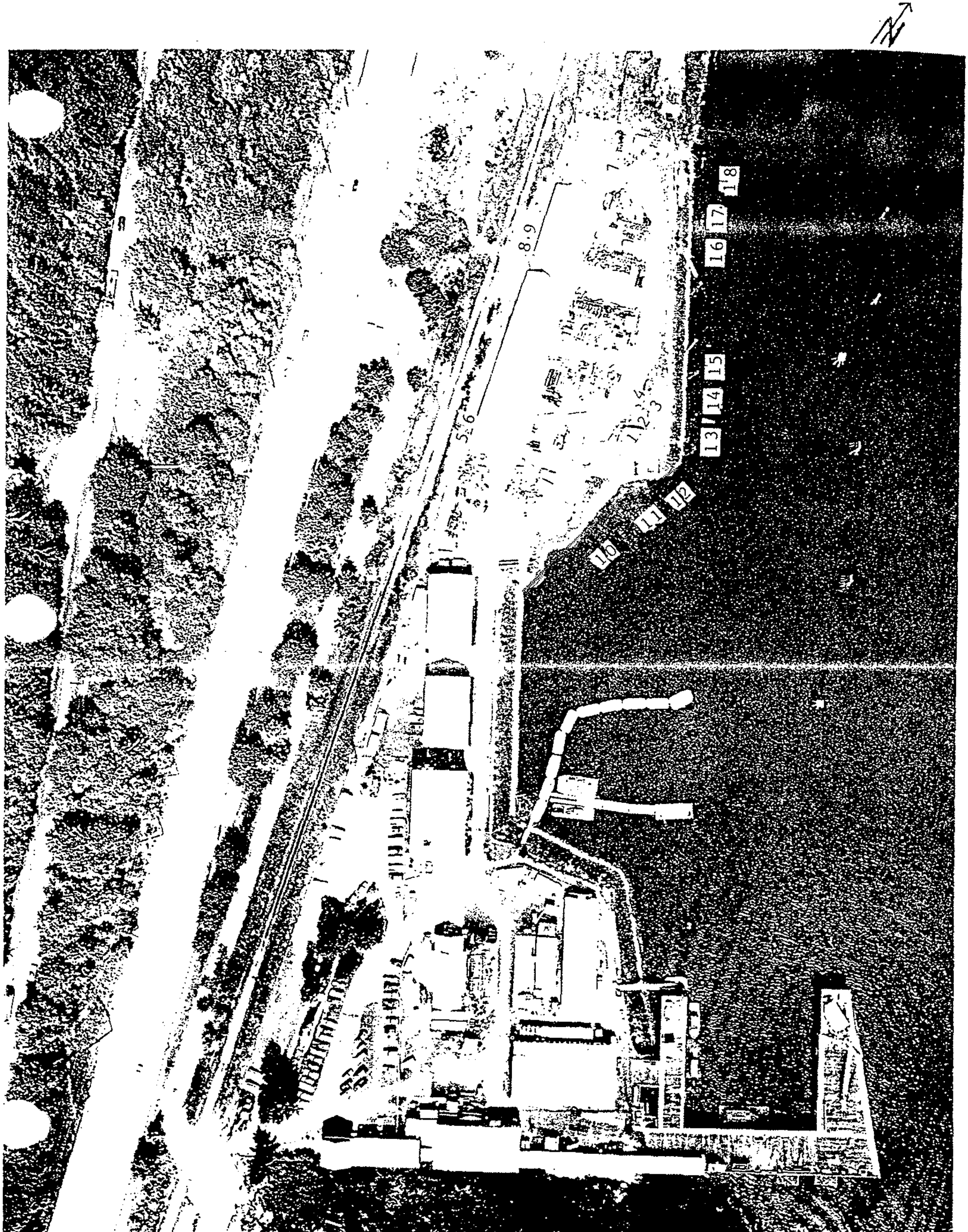
SCALE IN FEET

50 0 50 100 150

State Plane Coordinates – Oregon North Zone
Contour Interval = 2 Feet

Base Map Compiled from Aerial Photography Dated 11 June 1991.


U. S. MOORINGS
DRAINAGE MAP
Figure 2
CATCH BASIN
LIGHT POLE
POWER POLE
100 YEAR FLOOD ELEV. 27.5'
A-B SAMPLING POINTS
DRAINAGE AREAS
Infiltration, or Drainage to Infiltration Zone
Dry Well, no Off-Site Drain
Drainage Area 1
Drainage Area 2
Drainage Area 3
Drainage Area 4
Drainage Area 5
SCALE IN FEET
40 0 40 80 120
WILLAMETTE RIVER
GRID NORTH
SMALL BOAT BASIN
A DOCK
B DOCK
OILY WATER SEPARATOR 500 GAL.
OILY WATER SEPARATOR 500 GAL.
UTILITY VAULT VENT
STORM DRAIN 6"
6" OUTFALL
6" OUTFALL
Drainage Area 2
BOILER
YARD SHOP
PAINT STORAGE
WELD SHOP
PROJECT OFFICE
RADIO SHOP
HYDRO SURVEY
MACHINE SHOP
EQUIP. STORAGE
PORTHOLE
HAZMAT STORAGE
EMPLOYEE PARKING
Dry Well
Infiltration
Drainage Area 1
Drainage Area 3
WAREHOUSE BLDG A.
WAREHOUSE BLDG B.
WAREHOUSE BLDG C.
ON-GROUND STORAGE AREA
Infiltration no offsite drain
DREDGE PUMP OIL PRODUCTS STORAGE (COVERED & PALLATIZED)
BURLINGTON
NORTHERN
SOURCE OF DRAIN ON HIGHWAY
NO SOURCE EXISTS WITHIN PROPERTY



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